february 1957

MACHINE AND TOOL

Manufacturing V.P., D. Buchham

"...improved MANUFACTURING PLANNING -increased SAVINGS, PRODUCTION, PROGRESS

Also featuring: STEPED ALUMINUM EXTRUSIONS
(AISER'S C. J. Huffman

a hitchcock publication

CONTENTS ON PAGES 5 AND 6

Never Confuse the No. 8 MARVEL with an ordinary Band Saw

sonly the MARVEL is Universal



Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle without moving the serorle.





Only a No. 8 MARVEL con do all of these things: Snip-off a 1/4" red or cut-off on 18" s 18" cross section.







Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.



cut off and shape Structural Booms



"Rough Machine" to size and shape with minimun chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a universal tool-has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACH-INE TOOL" electrical standards; Dirt-proof ball bearings, etc.

If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.





The place to save money on drill press work

is here

The actual machining time in drilling, tapping, reaming or counterboring is usually fixed by the nature of the tool and material.

But the time taken in getting the tool to and from the material and the material to and from the tool is pretty much up to the ingenuity of the tool engineer. It's here that costs can be cut—added profits made.

It's here that two Bellows "Controlled-Air-Power" Devices can fit into your picture: The Bellows Drill Press Feed and the Bellows Rotary Work Feed Table. The Bellows Drill Press Feed attaches to the star wheel shaft of any standard drill press. A touch on the operating lever and the Feed advances the quill rapidly to the work, feeds the tool under hydraulic control through the work—and returns the quill quickly to starting position. The Bellows Rotary Work Feed Table feeds the parts swiftly, accurately and safely to the tool. All the operator has to do is load and unload—the rest is automatic.







WRITE FOR THESE TWO FREE BOOKS

Guick reading facts that will help you make more money on your drill press operations. Write The Bellows Co., Akron 9, Ohio, Dept. MTB-257
In Canada: Bellows Preumatic Devices of Canada: Ital, Taronto, Ontario.
Ask for Bulletins DF-110R or RT-1022,

7348.1

The Bellows Co.

AKRON 9, OHIO

MANUFACTURERS OF "CONTROLLED-AIR-POWER" DEVICES FOR FASTER, SAFER, BETTER PRODUCTION

Use postpoid card. Circle No. 201

think what you can do with Unlimited Reversing... found only on the Wade HAND LATHE

This exclusive Wade feature offers you amazing flexibility of operation, resulting in production possibilities obtainable from no other comparable lathe!

A Standard Single Speed Motor

is all that is required to drive. Instantaneous Reverse and Hi-Lo are provided through gears and Infinite Speed Changes through variable pitch pulleys. Speed ranges are from 100 to 3500 RPM, with a high-low ratio of 5-to-1 (also exclusive with WADE). Reverse ratio $2\frac{1}{2}$ times the slow speed.

Be sure to write for literature, so you can learn about the many other features which make this fine hand turret lathe one of the most valuable production tools you can have in your plant.



Himmons of KALAMAZOO

2 in []

NO-DUST GRINDER





SAVE OVER 50% FLOOR SPACE
THE HAMMOND WAY





DUST-LADEN AIR IS A MENACE!

- · Protect your employees' health.
- Protect nearby machine tools from dust and grit.
- Save floor space requires only 6½ square feet.
 For 10", 12", and 14" wheels.
 Write for Catalog.

Hammond Machinery Builders INC

1614 Douglas Avenue, Kalamazoo, Michigan

See us at Booth 165—Western Metal Show—Los Angeles—March 25-29.

Use postpaid card. Circle No. 203



READER'S GUIDE

MACHINE AND TOOL

blue book

44.7	February, 1957 Vol. 52 - No. 2	
	FEATURES THIS MONTH 91 AS THE EDITOR SEES IT 103	
	ROUNDUP OF WASHINGTON NEWS 107 LETTERS TO THE EDITOR 115	
Interview	Westinghouse Insists on Being Sure with More Emphasis on Planning By D. C. Burnham as told to P.A. Meline	92
Extruding	New Demands, New Applications for Stepped Aluminum Extrusions By C. J. HUFFMAN	119
Jig Design	Plate Type Jigs for Low Cost Drilling By Allan Young	129
Fixture Design	Designing Fixture for Milling Oil Grooves By C. T. Bower	132
Automation	Numerical Control System By L. S. Peck	138
Production	Extension Bed Gap Lathe Proves Versatility	146
Labor Relations	How Would You Decide?	151
Boring	Adapting Lathes for Boring Tubes and Castings	180



Accepted as Controlled Circulation Publication at Pontiac, Illinois Copyrighted, 1957, by the Hitchcock Publishing Company,

Copyrighted, 1957, by the Hitchcock Publishing Company, 222 E. Willow Avenue Wheaton, Ill.



Reader's Guide	· ·
	continued
Shop Hints	Special Drill Bushing159Minimize Pressure Pad Rocking160Machining Blind Angular Seat161Air Operated Holding Fixture166Reduce Cost of Radii Tools168
Field Reports	Standard Components Give User Quick Low Cost Special Machines
Departments	Meetings, Conventions, Exhibits 112 Free Literature 185 News of the Industry 209 What's New in Metalworking 247 The Market Place 372 Products Index 373 Index to Advertisers 378
Editorial Staff	W. F. SCHLEICHER, vice-president and editorial director; P. A. MELINE, managing editor; D. M. CARLSON, assistant editor; E. McDaniel, associate editor; W. W. Burton, editorial assistant; Richard C. Bush, editorial production manager, V. F. Boyer, Reader's service, H. O. Erickson, Research Manager.
Editorial Advisory Board	M. John Ahlstromer, asst. factory manager, Chicago Screw Co.; Ronnie Burritt, factory manager, J. J. Tourek Mfg. Co.; John V. Carlson, gen'l. supt., Union Special Machinery Co.; R. T. Carlson, supt., NRK Mfg. & Eng. Co.; Rocer Farrie, Consulting

Business Staff

Screw Co.; Ronnie Burritt, factory manager, J. J. Tourek Mfg. Co.; John V. Carlson, gen'l. supt., Union Special Machinery Co.; R. T. Carlson, supt. NRK Mfg. & Eng. Co.; Roger Fardig, Consulting Engineer; Ed Fluskey, Consulting Engineer, Revere Camera Co.; Homer F. Griffith, asst. works mgr., Construction Equipment Div., International Harvester Co.; Joe Kosinski, works mgr., Scully-Jones & Co.; Paul Prikos, vice pres., Prikos & Becker Tool Co.

R. C. VAN KAMPEN, president; VINCENT C. HOGREN, executive vice-president; HENRY J. SMITH, DAN E. REARDON, JAMES C. STEWART, vice-presidents; M. L. YONTS, production manager; OLIVER S. PEPPER, business mgr.; LOREN D. JOUETT, Director of Marketing; L. M. SCHROEDER, art director; R. L. SPRECKELS, circulation manager.

Hitchcock District Managers are Listed on Page 64.

MACHINE AND TOOL BLUE BOOK

Subscription rates: \$5.00 per year in U.S.A. \$6.00 per

\$6.00 per year elsewhere.



PACKING COMPANY

Cincinnati Filmatic



Highest quality of sizing and roundness is obtained at low cost by grinding these anti-friction bearing rings on a CINCINNATI FILMATIC No. 4 Centerless Grinder equipped with Power Race Grinding Fixture.

(Photo courtesy of McGill Manufacturing Company, Inc., Valparaiso, Indiana)



CINCINNATI

CENTERTYPE GRINDING MACHINES . CENTERLESS GRINDING MACHINES . ROLL GRINDING MACHINES . SURFACE

Nos.⁰ 2 3 6 Centerless

The No. 4 is the machine for this job

. . . grinding thin wall
rings to perfect roundness

FILMAN

Thin wall rings are extra sensitive to OD grinding pressure . . . the lower it is, the better for accuracy. A prominent manufacturer of precision anti-friction bearings is well acquainted with this factor in production work, and keeps it under control by grinding large diameter rings on a cincinnati® filmatic No. 4 Centerless. And there's a good reason for choosing the No. 4. The bed is inclined at a 30° angle, resulting in an increased driving ef-

fort by the regulating wheel. Even with no grinding wheel contact, the work rotates with the regulating wheel. ¶Other advantages of CINCINNATI FILMATIC No. 4 Centerless Grinders are outlined in catalog No. G-538-3. A copy is yours for the asking. You will find brief specifications on the entire line of six CINCINNATI FILMATIC Centerless Grinders in Sweet's.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

CINCINNATI FILMATIC
No. 4 CENTERLESS
GRINDING MACHINE



GRINDING MACHINES . CHUCKING GRINDERS . MICRO-CENTRIC GRINDING MACHINES . CENTERLESS LAPPING MACHINES

The TREE 2UV MILL

gives you these features-

- · Roller Drive
- · One Clamp Turret Lock
- Automatic Collet Closer
- · Built-in Power Feed
- Rapid Traverse
- Labor Saving
 Operator Controls

plus Versatility

The TREE 2UV Vertical Mill combines rigidity and flexibility to make it one of the most versatile on the market today. The following features make it adaptable to a wide range of jobs:

- Fully universal milling head with power feed
- Dovetail type ram—360° movable turret
 Table 10½"x42" power feed and rapid traverse
- Hardened and ground lead screws by Ex-Cell-O
- Ample range: 25" longitudinal, 11" transverse. 17½" vertical travel
- Weight—2400 lbs.

Write for complete information . . .

TREE TOOL AND DIE WORKS

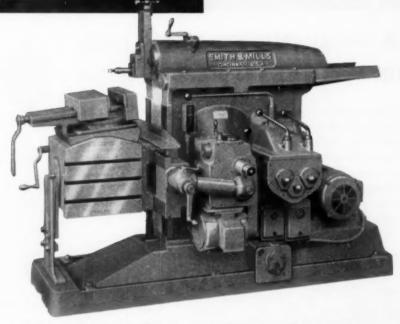
1600 JUNCTION AVENUE

RACINE, WISCONSIN

Manufacturers of—MH-4 UNIVERSAL MILLING HEADS TB-4 TAPER BORING TOOLS

SHAPERS

Smith & Mills



Compare Smith & Mills with any other shaper for versatility, speed, cutting power and precision performance. Compare and you'll buy Smith & Mills—famous for high quality shapers since 1888. Write or wire for prices, deliveries, repair parts or field service. Smith & Mills Shaper Division, Nebel Machine Tool Corp., 3491-B Central Parkway, Cincinnati 25, Ohio.

Smith & Mills Shapers now available in Heavy Duty Models in 16", 20", 25", 28", 32" and 36" strokes, and Standard Duty Models in 20" and 24" strokes.



Prutton

THREAD ROLLING MACHINERY

FOR SPECIAL COLD ROLL THREAD PARTS REQUIRING MACHINES OF SPECIAL DESIGN

Prutton specialized and complete engineering service applied to your production can open up new horizons in high-volume, high quality, close-tolerance thread rolling. For instance: Production rates of parts illustrated at right—6,000 Double-Ended Motor Mounts Per Hour; 6,000 Precision Speedometer Worms Per Hour; 9,000 Tubing Nuts Per Hour.











These high speed production operations employed the Exclusive Prutton MANDREL SYSTEM TO SUPPORT THE INSIDE DIAMETER.

Let us demonstrate how Prutton superiority can work for you. Submit your special design parts for our recommendations. No obligation, whatsoever.



Prutton Corporation

5296 WEST 130th ST.

CLEVELAND 30, OHIO

NEW ...

Today's Lowest-priced "Working" Gage Blocks!



Brown & Sharpe MILLING, GRINDING, AND SCREW MACHINES • CUTTERS MACHINE TOOL ACCESSORIES • PRECISION TOOLS • PUMPS

Now high precision standards for use "on-the-job" are practical in any shop! New Brown & Sharpe "Thrifty Jo's" give you "Class B" accuracy at greatly reduced cost. You can use "Thrifty Jo's" to check the accuracy of your regular working gages. Or, you can assemble them into actual working gages, using Brown & Sharpe Jo-Block Accessories. They save time and money on literally hundreds of different measurements in every department.

Brown & Sharpe "Thrifty Jo's" are available at your Brown & Sharpe Distributors. In sets of 84 or 36 blocks, or as individual, standard sizes. Thrift carbide wear blocks available for use as outer blocks. Send for Catalog of complete Jo-Block Line. Brown & Sharpe Mfg. Co., Providence, R. I.

eighteen identical APEX insert bits...



- Here are eighteen Apex 440-2 insert bits for No. 2 Phillips recess.
- Each bit fits perfectly into the screw head recess, gets a firm purchase to drive the screw smoothly and easily.
- Every bit is precision-built of special shock-resisting steel, and is notched at the hex corners to accept the patented bit retaining ring found only in Apex bit holders.

...for eighteen different screwdriving jobs

These eighteen Apex insert bits are identical, except that each one has been hardened through one of three basically different heat treatments, then tempered to meet one of eighteen totally different application requirements. These varying degrees of tensile strength and Rockwell C hardness provide the proper combination of toughness and hardness, insure greater resistance to impact, fatigue and wear. That's why Apex bits last longer, drive more screws, help reduce screw-driving costs.

Selection of the correct Apex bit for a specific screwdriving application is controlled through the complete records Apex maintains on each customer's requirements. You can select Apex insert bits exactly tailored to your requirements, to drive Phillips, Frearson (Reed & Prince), Slotted, Clutch Head or Socket Head screws. Apex—the authority on fastening—offers a complete range of screwdriving tools for manual or power operation. Write on your company letterhead please, for Catalog 21.



THE APEX MACHINE & TOOL COMPANY 1028 S. Patterson Blvd. • Dayton 2, Ohio

ATLANTA · BALTIMORE · BATON ROUGE · BIRMINGHAM · BUFFALO · CHARLESTON CHICAGO · CLEVELAND · COLUMBUS (Nework) · DALLAS · DAYENPORT · DENVER DETROIT · HOUSTON · INDIAMAPOLIS · KANSAS CITY · LOS ANGELES · LOUISVILLE AEMPHIS · MILWAUKEE · MINMEAPOLIS · NEW ORLEANS · NEW YORK CITY · OAKLAND CHILADELPHIA · PITISBURGH · PROVIDENCE · ROCKFORD · ST. LOUIS · SEATTLE



newest high-speed radial

Your many demands for a high-speed lightduty radial are met—completely and economically—by this new Gilbert 3 hp machine. Compare its new features with other radials of equal capacity, and you see why the Gilbert is the best buy in its class. Traditional Gilbert accuracy, fast response, and wide-angle work visibility make your shop more productive, more versatile. Variety of bases, runway mounting, or tables available. Get all the details in Bulletin 255.

The Cincinnati Gilbert Machine Tool Co. 3352 Beekman Street, Cincinnati 23, Ohio

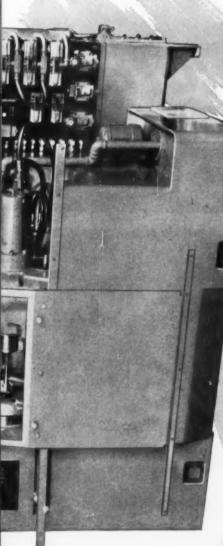
BULLARD

Announces the acquisition of the

DE STREET STREET

AVAILABLE
IN THREE MODELS
TO MEET A
WIDE RANGE OF
REQUIREMENTS

GFORMERLY MANUFACTURED BY HYDRA-FEED MACHINE TOOL CORPORATION)



FEATURES

Unobstructed front view design allows faster loading and unloading . . . easier set-up . . . with less operator fatigue.

When used as a tracer lathe templates are above work piece where dirt, chips and cutting oils cannot interfere with work accuracy.

Oversized chip chute with pan below the entire work area ... readily accessible from end, rear or bottom of machine.

Massive strength and rigidity with extra power to take full advantage of maximum feeds and speeds obtainable with multiple carbide tooling.

THE BULLARD COMPANY

286 CANFIELD AVENUE - BRIDGEPORT 9, CONNECTICUT Please send me a copy of the

BULLARD HYDRA-FEED CATALOG

NAME

COMPANY

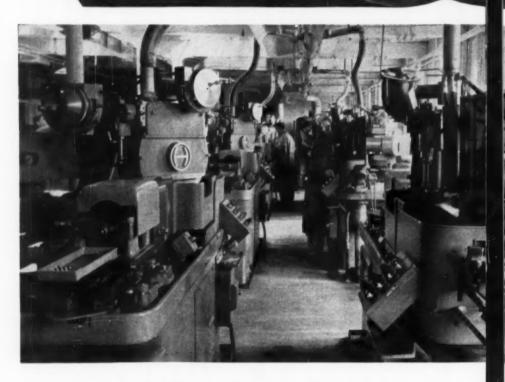
ADDRESS

CITY

ZONE

Another

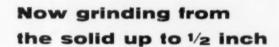
MORSE



Still another Reason why

Morse First

THE FIRST OF THEIR KIND ...



And, here's what it means to you:

- * Smoother finish . . . better than polished flutes!
- \bigstar Consistently held tolerances . . . never attained by milling!
- * Better points . . . because of uniform flute depth!
- ★ Longer tool life . . . lower cost per hole!

This is why the new Morse flute ground drills are setting a new standard for quality . . . and, the only man who can show you is your Morse-Franchised Distributor.

MORSE TWIST DRILL & MACHINE COMPANY New Bedford, Massachusetts

Subsidiary of VAN NORMAN INDUSTRIES, INC. Warehouses in New York, Chicago, Detroit, Dallas, San Francisco

MORSE means
"THE MOST" in Cutting Tools



1. Cures "stick-slip" or "jumpy table". When a table gets the "shakes", especially after it has just reversed or when the load is heavy and the speed slow, it's probably suffering from "stick-slip". Remedy—Sunoco Way Lubricant®. Special polar compounds in Sunoco Way Lubricant form a friction-reducing film that keeps a table sliding smoothly under all operating conditions.



2. Doesn't squeeze out. When you use a heavy oil as a way lubricant, you must use a lot of oil to maintain a thick enough film. But, heavy oil squeezes out if the table sits in one position very long. You have a tough time getting the table moving again. Protected by the tenacious thin film formed by Sunoco Way Lubricant, the machine can be idle for a week and it will start easily.

WHY SUNOCO WAY LUBRICANT CAN HELP **CURE YOUR MACHINING PROBLEMS**



3. Protects expensive ways. Badly scored or pitted ways, caused by inadequate way lubrication, result in lost production and expensive repairs. The high film strength of Sunoco Way Lubricant eliminates the danger of metal-tometal contact, the chief cause of scoring and way wear. Excellent metal-wetting and non-corrosive properties eliminate rusting and pitting.



4. Approved by more than 55 machine-tool builders. Every major machine-tool builder has tested Sunoco Way Lubricant. It is always approved. In fact, to assure maximum efficiency of their product, many manufacturers ship a supply of Sunoco Way Lubricant with each machine. We'll be glad to send you the list of manufacturers who have approved Sunoco Way Lubricant.

For more information, see your Sun Representative, or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. MT-2

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

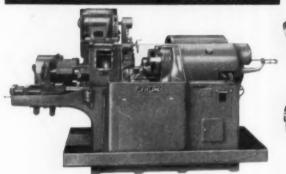
SUN OIL CO.



Use postpaid card. Circle No. 215

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO and MONTREAL

21/2" MODEL "AW" SINGLE SPINDLE



Several examples of typical Model "A W" production are shown here. Note the profitable production rates the variety of operations performed with simple feetings.

> Material: 24ST Aluminum Operations: Drill (2); C'bare; Ream; Foce; Form (2); Cut-off, Production: 62 pieces/for.

Material: SAE 2317 Operations: Drill (2); C'bore; Top; Face; Form (2); Cut-off, Production: 41 pieces/hr.

Material: FM Brass Operations: Drill (2), Thread, Bore; Farm, Knurl; Cut-off. Production: 110 pieces/hr.

Material: SAE 4615 Operations: Turn; Form (2); Thread; Center; Face; Chamfer; Cut-off. Production: 36 piecos/hr.

Material: 245T Aluminum Operations: Drill (2); C'bare; Chamfer; Face (2); Form (2); Cut-oft, Production:



Write for this new bulletin for full details on the 2½" Model "AW" Cleveland

CUTS YOUR COSTS 3 WAYS!

More than 65 years of automatic screw machine design experience has been engineered into this new Model "AW" Cleveland. Its many modern features will enable your shop to set new economy records for fast, accurate production of turned and formed parts... and you sate three ways:

YOU SAVE ON BASE PRICE

Your savings start at the first cost, as the $2\frac{1}{2}$ " Model "AW" is offered at a base price of \$3500 to \$4000 less than other comparable automatics!

YOU SAVE ON SET-UP TIME

Such features as universal camming . . . rapid hand crank stock feed adjustment . . . quick change collet pads . . . maximum accessibility for tooling . . . make this Cleveland quick to set-up and exceptionally economical to operate. Spindle speeds range from 69 to 1920 rpm, providing efficient cutting speeds for all types of materials and tools. Four full automatic speed changes are available. Gear changes are quickly made.

YOU SAVE ON MAINTENANCE AND FREEDOM FROM DOWNTIME

Simplicity is the keynote of this Cleveland design. Completely free from complex mechanism and controls requiring constant attention or adjustments, this rugged, fool-proof automatic will assure the user dependable day-in, day-out performance!

To find out how much this new Cleveland can save you on your parts production, ask your Cleveland representative to submit a cost proposal with production estimates based on prints or samples of your work. There is no obligation.

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4934 Beech Street Cincinnati 12, Ohio

SALES OFFICES: CHICAGO CLEVELAND - DETROIT HARTFORD - S. ORANGE

Manufacturers of a Complete Line of Single Spindle Automotic Screw Machines and High Pressure Hydraulic Die Casting Machines

Use postpoid card. Circle No. 216



Why hats are off to CIMCOOL...

...because CIMCOOL° has become, in just a few years, the largest selling cutting fluid in the world. And sales of this radically new and different coolant are continuing to climb because CIMCOOL Standard Concentrate has two big advantages over old-fashioned cutting fluids.

CIMCOOL LOWERS COSTS because it's longer lasting in machines. Thus, it reduces downtime and cuts labor costs for cleaning and changing.

CIMCOOL DOES A BETTER JOB because of its chemical lubricity. It permits faster speeds and increases tool life, for it combines friction reduction and cooling capacity in a degree never before attained.

We'll be happy to supply information on the many specific advantages of Cimcool Standard Concentrate—or details on the entire family of Cimcool Cutting Fluids. Just contact us. Wire, write, or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

*Trade Mark Reg. U.S. Pat. Off.

CIMCOOL CUTTING FLUIDS

CIMCOOL Concentrate—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

CIMCOOL Tapping Compound—Permits the use of highest tapping speeds and increases tap life amazingly.

CIMPLUS—The transparent grinding fluid with exceptional rust control. Also used for machining cast iron and as a water conditioner with Cimcool Concentrate.

CIMCUT Base Additive—For jobs requiring an oil-base cutting fluid. Added to mineral oils, it gives an economical mix for higher speeds and feeds.

CIMCOOL Bactericide—The most effective agent yet developed to overcome rancidity and foul odors.

CIMCOOL Machine Cleaner — The two-phase non-corrosive cleaner that removes grit, dirt, slime and oil.

CIMCOOL Cutting Fluids

for 100% of all metal cutting jobs

PRODUCTION PROBUCTS OF THE CINCINNATI WILLING MACHINE CO



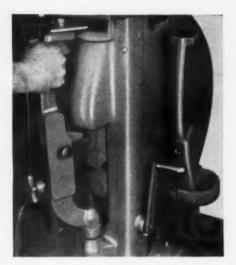
OLIVER TEMPLATE TOOL BIT GRINDER

Precision Duplication

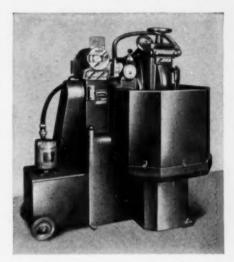
in **ONE** operation

That's right! The Oliver Template Tool Bit Grinder sharpens single point tungsten carbide, high speed and stellite turning tools . . . duplicating exactly all original flats and radii every time the tool is ground . . . in one simple, efficient grinding operation.

How is it done? Well, as you can see from the drawing above the answer lies in "template control." The template at the top of the specially designed tool holder is a twice size replica of the tool being ground. The tool, securely held at mid-point in the holder, contacts the wheel and is ground until the template touches the template stop. In this manner, the tool is ground to the exact profile of the template. The entire operation is performed in seconds, easily, accurately on one machine . . . a machine that pays for itself by reducing your tool inventory and eliminating lost production time and tool breakage.



The Oliver Template Tool Bit Grinder has a 20° wheel that grinds turning tools up to 1½° wide by 1¾° high, from 0° to 20° clearance . . . and to any predetermined contour or angle. The unit is self-contained in that it performs the complete grinding operation as well as template production. All working surfaces are hardened and ground steel and surfaced with tungsten-carbide where necessary to assure long life. A unique feature of the unit is the tool holder which permits an even, easily controlled tool pressure against the wheel. It's an iron frame-supported at its lower end by a ball and socket joint with a template at the upper end giving the operator a 2 to I leverage.



Outstanding among the Oliver Tool Bit Grinders' many advantages is ease of operation. Positive "template control" assures duplication of the tool shape in relation to the shank making all tools of a kind exactly alike. A clearance setting gauge determines the correct amount of metal to be removed. A plentiful supply of water, both through the wheel and on the tool, insures against overheating. The Oliver 20' Template Grinder will remove metal... both high speed and tungstencarbide . . . at a speed unmatched by any other single point tool bit grinder currently on the market.

More OLIVER of ADRIAN Tool Grinding Equipment



ACE TOOL and CUTTER GRINDER

Universal-grinds milling cutters, other cutting tools. Especially suited to grinding tungsten carbide.



DIE MAKING MACHINE

Produces dies, gages, cams, templates, stripper plates, etc. at greatly reduced costs. 5 designs in 2 types.



FACE MILL GRINDER

Completely a
A machine too
for accurate
Wheel dress
every stroke. Completely automatic. A machine tool designed for accurate grinding. Wheel dressed with



No. 510 DRILL POINTER

Semi-automatic. For drills 14" to 3" in dia-meter. No. 21 bench meter. No. 21 bench models available for size ½ and smaller.



DRILL POINT THINNER

For low cost reclaiming of drills. Corrects off-center and too-thick webs and outof-index cutting edges.

Just	check	the	coupon	for	literature	on	the	OLIV	ER	of
ADR	IAN me	chin	e you ar	e in	terested in.	Ser	nd it	today	to	

OLIVER of ADRIAN OLIVER INSTRUMENT COMPANY

1408 E. Maumee St. . Adrian, Michigan

Drill	Point	er	
		-	4.4

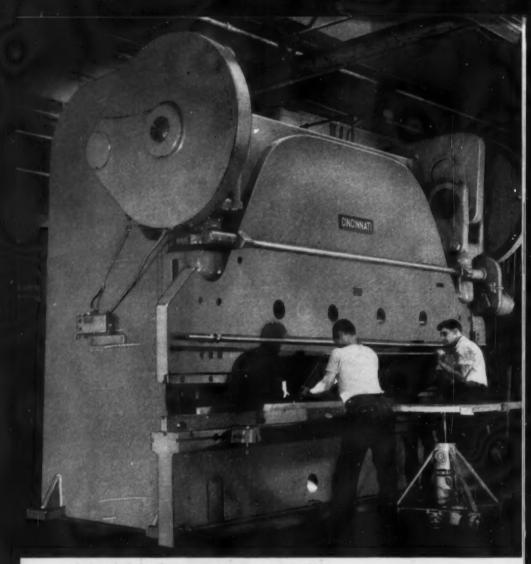
- ☐ Face Mill Grinder
 - and Cutter Grinder
- ☐ Die Making Machine Drill Point Thinner
- ☐ "Ace" Universal Tool ☐ Template Tool Bit Grinder

NAME

COMPANY

STREET_

CITY_ ZONE. STATE.



This 13 Series x 12' Cincinnati Press Brake has a capacity of 250 tons and is used for many types of forming and punching work at the Falstrom Plant.

This 2512 Series Cincinnati Shear has a capacity of % x 12 long mild steel plate, and is used to shear a variety of metals to micrometer accuracy.

Photos courtesy Falstrom Company, Passaic, N. J.



THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS . SHEARS . BRAKES

Cincinnati Shears and Press Brakes produce a wide variety of precision custom metal work

at PALSTROM COMPANY, Passaic, N. J.

Three Cincinnati Shears and five Cincinnati Press Brakes are profitable producers in this finely equipped plant. A broad variety of precision work in many different metals is done on these versatile machines, yet changes from job to job are made rapidly with minimum loss of time. Due to the accuracy of their Cincinnati Shears and Press Brakes, Falstrom Company has

been able to minimize the use of welded construction in their special fabricated products.

Consult our Application Engineering Department about your production problems, and write Department H for Catalog S-7R on Cincinnati Shears and Catalog B-4R on Cincinnati Press Brakes.



Multiply the use of your surface grinder...

+ Add a Whitnon HIGH SPEED ATTACHMENT



present grinder.

Whitnon surface grinder attachment comes as a complete kit, and can be shipped in a fitted wooden case. The offset pulley No. 5 makes it possible to reach into deeper holes and recesses than the flat pulley. Tapered arbors up to 4" in length available for direct wheel mounting if required.



Bracket 2. Eccentric bushing 3. 20,000 RPM grease lubricated spindle 4. Flat pulley 5. Offset pulley
 Belt 7. Wheel & pulley mount 8. Collet type arbor 9. Arbor wrenches 10. Wheel & wheel mount wrench

THE WINTERON MANUFACTURING COMPANY ROUTE & AND NEW BRITAIN VE , FARMINGTON, CONNECTICUT



A few precision pieces produced on Gorton 2- and 3dimensional Pantographs which saved time and money.



Aultiple Pantographing

VOLUME PRODUCTION — PRECISION TOLERANCES

Tool Room Accuracy and High Production are Gorton Characteristics! From a dozen to a million pieces at exceptional repetitive accuracy. From two to six different operations performed at one setting. Automatic Cycling during engraving, milling, profiling, chamfering, counter-boring, grooving, routing, slotting, graduating, grinding, etching. Production

is dependent only on cutter capacity. Spindle speeds from 900 to 45,000 R.P.M. Conventional or climb milling. Manual control for short runs. Automatic eyeling for production runs.

3 Services Available

1. 16 Standard Models

2. Expertly-Designed Special Tooling

3. Custom-Built Special Machines

Newest Gorton 2-dimensional Pantograph, PI-2 Heavy-Duty model.





GEORGE GORTON MACHINE CO.

1402 RACINE STREET

RACINE, WIS.

Traces-Controlled Pantagraphs, Duplicators—standard and special . . . Harisental and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

A 8846-1PA

Write for

Bulletins

WIDE Acceptance





You Get
Peak Performance
with an INDEX
Model "60"
HORIZONTAL MILL

• Simple, efficient, compact, with all operating parts enclosed, yet readily accessible. Unusually low-priced. Designed for the average tool room, yet highly suitable for production shops through its rigidity and low maintenance cost. Standard table 40" x 9", larger table optional.

The INDEX LINE also includes the Famous "SUPER 55" and the Popular "45" Vertical Mills

Write for Literature

INDEX MACHINE Co.

540 M. MECHANIC STREET

JACKSON, MICHIGAN









FORM TOOL



Newest Materials and Methods — Plus the Toughest "Proving Ground" in Industry

What makes one tool better than another? Engineers boil it down to three factors: (1) careful selection of the newest tool materials, (2) proper tool design, (3) accurately controlled heat treatment.

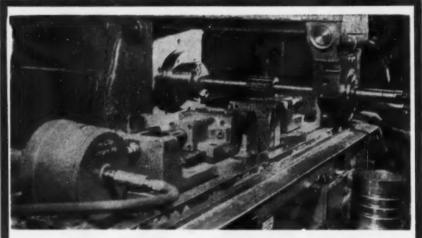
Continental is constantly testing these three factors in actual production in Ex-Cell-O plants.

Call your Ex-Cell-O representative or contact Continental direct.



56-62





AUTOMATIC MACHINING OPERATIONS FOR UNDER \$300

With MilOmatic air powered hydraulic vises, you can tool-up for milling, drilling, shaping, or broaching in hours instead of days, at much lower cost. Mounted on any machine, they provide fully automatic work holding, and can be converted to new jobs by installing specially shaped jaw inserts. MilOmatic cuts loading time 80%, increases production, makes automation a profitable reality. For the tooling you need immediately, and in the future, order MilOmatics now!

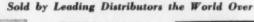
FOR DETAILS WRITE . . .





WILTON TOOL MFG. CO., INC.

DEPT. MTBB-2, SCHILLER PARK, ILLINOIS







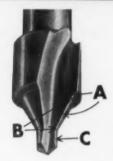




RO
UNIVERSAL
FORM RELIEVING
FIXTURE

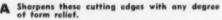
R-O Grinder

THE LIFE OF MANY
STANDARD AND SPECIAL
PERISHABLE CUTTING
TOOLS CAN BE DOUBLED
BY PROPER GRINDING









B No undercutting at intersection — no burr on work piece.

C Diameters can be cylindrically ground or relieved as desired.

Form relief leaves more metal behind the cutting edge to strengthen it and produces a keener edge that stands up longer. The "R-O" fixture is available separately but for greatest benefit should be used with the "R-O" tilting and adjustable grinder and high speed internal grinding attachment. The "R-O" base completes the assembly.

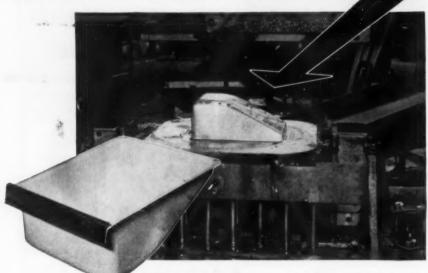
Write or Call for Information

GRINDER DIVISION

Royal Oak Tool & Machine Co. 27000 Stephessen Hy. Royal Oak, Mich. Lincoln 7-1000

Here's how A-L CAST-TO-SHAPE TOOL STEELS

solved a serious scrap problem on this job



SEND FOR THIS **NEW CATALOG**

"FORGING AND **CASTING PRODUCTS**"

Contains the latest information on FCC Air Hardening, Oil Hardening and other Cast-to-Shape Tool Steel Specialties that can save you time and money . . . also Composite Die Sections and Smooth Ham-mered Forgings in a wide range of tool and stainless steels. Get your copy NOW.

> ADDRESS DEPT. WIE-86

A well-known manufacturer of electrical appliances formerly used dies of alloyed ductile iron castings to draw refrigerator crisper pans.

These dies had to be redressed after every 10,000 pieces (approximate cost: \$1300 each) and had to be replaced after every 30,000 pieces. 8 to 10% of the pans were scrapped due to defects.

Because of this scrap problem and the severity of the draw -a 52% reduction of the steel-it was decided to rebuild the dies using a suitable grade of tool steel.

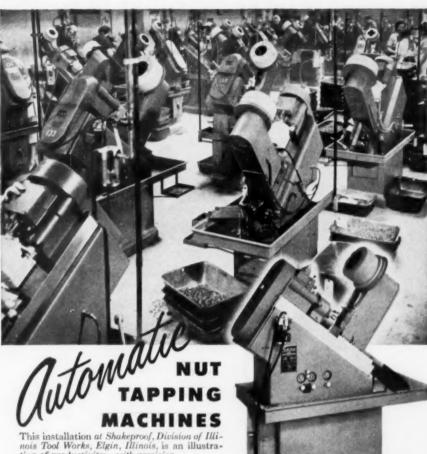
A 2" cut was taken off the top of the old cavity and the draw ring. These cuts were replaced with A-L Cast-to-Shape tool steel rings of high carbon-high chromium analysis. Total cost was nominal compared with buying entirely new dies.

Each of the revised dies has produced approximately 500,000 pans. Their condition indicates that probably twice that many can be drawn before the dies must be redressed. Defective paces have been reduced to a mere 11/2 to 2%-an 80% reduction!

 Ask your A-L representative TODAY how Cast-to-Shape tool steel can help solve your production problems . . . or write Allegbony Ludlum Steel Corporation, Forging and Casting Division, Detroit 20, Mich.

For complete MODERN Tooling, call legheny Ludle





tion of productivity-with precision.

Simplicity of set-up and lower operational costs can make your Nut Tapping Department one of the most efficient and profitable in your plant. Submit samples and prints for a comparison with your present method.

VERTICAL DRILLING MACHINES VERTICAL TAPPING MACHINES VERTICAL THREADING MACHINES TWO SPINDLE MACHINES ANGULAR MACHINES NUT TAPPING MACHINES HORIZONTAL MACHINES DRILLING AND TAPPING UNITS AUTOMATIC JIGS AND FIXTURES DRILL PRESS TAP HEADS

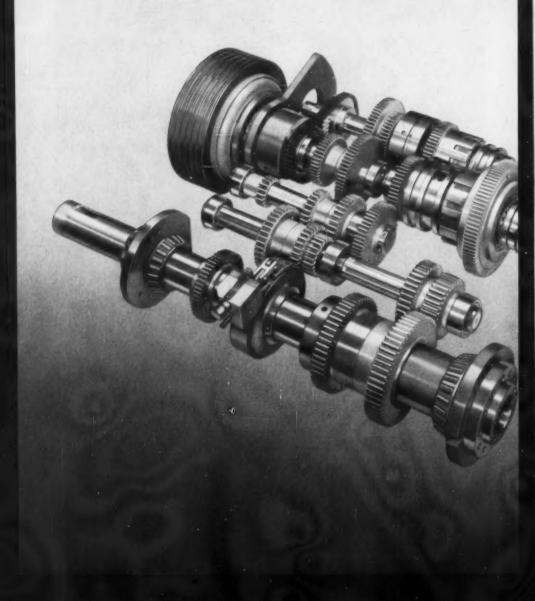
MANUFACTURING COMPANY

435 EASTERN AVENUE, BELLWOOD, ILL.

(Suburb of Chicago)

The power reserve and range of speeds

YOU'LL NEED FOR THE



TOOLS OF TOMORROW

New GISHOLT MASTERLINE SADDLE TYPE TURRET LATHE

WANT MAXIMUM OUTPUT AND ACCURACY from today's carbide tools—with an ample reserve of power and speeds to meet tomorrow's tooling requirements?

That's what you'll get—now—from this powerful, rugged Gisholt MASTERLINE Saddle Type Turret Lathe. Prime example of this machine's advanced features is the rugged Headstock Gear Train, shown at the left. Here, you can get 24 different forward speeds—all from a single-speed motor. This means you get full power all the time—a critically important feature for those heavy cuts at punishing feeds.

But that's not all. To give you maximum performance from this powerful gear train, Gisholt designers have backed it with faster speed changes through the Hydraulic Speed Selector (effortless speed shifts without waiting or computing); a hydraulically operated Hi-Lo speed change in a 6:1 ratio (without stopping the spindle or shifting gears); and a new Self-Adjusting Electric Clutch and Brake (smooth, fast starting and stopping, plus more accurate inching of the spindle).

Ask your Gisholt Representative to give you the complete facts. Why not call him today?



G SMACHINE COMPANY



Madison 10, Wisconsin, U.S.A.

TURRET LATHES . AUTOMATIC LATHES . SUPERFINISHERS
BALANCERS . PACKAGING MACHINES . MOLDED FIBERGLAS PLASTICS



Why Don't You GO MODERN?

You spread manure and sow the seed,

To make your lawn grow rich and green.

And then you sweat to keep it short

With an old time cutting-off machine.



Nobody has to sweat when you cut off tubing up to 8 inches in diameter—and bar stock—on the Modern Cutting-off Machine equipped with automatic loader. Once the loader is filled with stock—in random lengths if you wish—you simply push the button and go back to your pinochle game.

This machine is fast—accurate—economical—It will save you money.

Write for full story—and catalog.

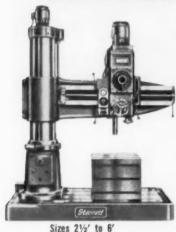
MODERN MACHINE TOOL CO.

2005 LOSEY AVENUE Jackson, Michigan

Best Values in U.S.A.

New Features - High Quality . . .

STARRETT RADIAL DRILLS

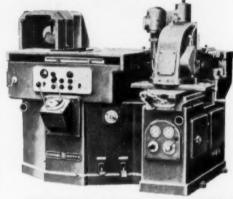


from \$1785. to \$6985.

OUTSTANDING NEW MACHINERY at Lower Cost!

\$1. BUYS ANY MACHINE upon termination of 3 year rental plan

HOMMEL model OPSM



OPTICAL PROFILE GRINDER

IMPERIAL LATHES—Flame Hardened and Ground Bed Ways



OVERBECK external and internal—precision GRINDERS



Cap. 1-9/16" O.D. x 43/4" \$2,995.



Cop. 23/8" x 43/4" \$3,195.

AARON MACHINERY CO., INC.

Dept. M • 45 CROSBY ST., NEW YORK 12 • WA 5-8300

TERMS



Why designers specify FLEXLOC self-locking nuts

Where products must be tough . . . must stand up under vibration, shock and abuse . . . designers specify rugged, reliable, precision-built FLEXLOC self-locking nuts as fasteners.

Here's why: FLEXLOC locknuts are strong: tensile strengths far exceed accepted standards. They are uniform: carefully manufactured to assure accurate, lasting spring tension in the flexible locking collars. And they are reusable: rough screw threads,

repeated removal and replacement, frequent adjustments will not affect their locking life.

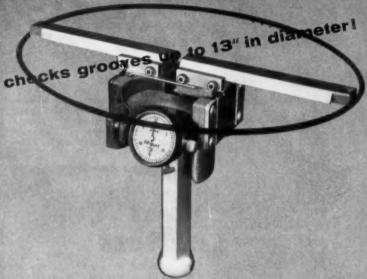
Standard Flexloc self-locking locknuts are available in a wide range of standard sizes and materials, to meet the most critical locknut requirements. Your authorized industrial distributor stocks them. Write us for complete catalog and technical data. Flexloc Locknut Division, STANDARD PRESSED STEEL Co., Jenkintown 52, Pa.

STANDARD PRESSED STEEL CO.

FLEXLOC LOCKNUT DIVISION

KINTOWN PENNSYLVANIA

BRYANT GROOVE GAGE



The Bryant Groove Gage gives you fast, accurate inspection at low cost. With long segments, as shown, you can measure grooves up to 13" in diameter.

The standard Bryant Groove Gage kit includes four pairs of segments to check "O" ring grooves through 5" dia. and four pairs of



segments to check snap ring grooves through 5" dia. Immediate delivery from stock.

Also available: Bryant bench gages to measure internal threads, external threads, concentricity and squareness of face, and portable gages for checking internal threads. Write for complete information.

Bryant Gage & Spindle Division

P. O. BOX 620-E: SPRINGFIELD, VERMONT

Division of Bryant Chucking Grinder Company

AT Chicago Rivet ALL 3

will reduce your Fastening Costs

rivets

Semi-Tubular, © Split and Shoulder

You avoid machine down-time because every semi-tubular, full tubular, split, shoulder or special rivet is precision made and hand inspected to assure free, non-clogging movement in automatic setters.





rivet setters

Your fastening costs are less because Chicago Rivet makes machines that set from one to seven rivets at a time. Riveting is automatic and may involve the use of special indexing fixtures, adjustable riveting centers, and top or bottom rivet feeding and other mechanisms, controlled by solenoids or air cylinders or both.

Chicago Rivet

& MACHINE CO.

9610 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois Branch Factory: Tyrone Pa.

New Rivet Catalog contains engineering data, list of popular semi-tubular, full tubular, split and shoulder rivets and popular automatic rivet setters. Write for capy.



engineering

The recommendations of Chicago Rivet Engineers are most valuable. Their knowledge of rivet fastening techniques, gained from solving thousands of manufacturers' fastening problems can help make your product more competitive. Calling Chicago Rivet is a habit-formed procedure with many companies. You incur no obligation when you use the service of Chicago Rivet Engineers. Send a blue print or sample assembly with your inquiry.



The Jacobs Model 91 Spindle Nose Collet Chuck for tool room and engine lathes.

Rubber-Flex® Tap Chuck for tapping heads and impact tools of all types. The Jacobs Ball Bearing Super Chuck for heavy duty and precision industrial use. The Jacobs Model 96 Collet Chuck for grinding machines, millers and jig-borers.

The Jacobs Impact Keyless Chuck especially designed for the aircraft industry. The Jacobs Plain Bearing Chuck for drill presses, portable electric and pneumatic tools.

ENGINEERS

STEEL SQUARES

PRECISION GROUND No. 400 SQUARE DIMENSIONS

Size	Thick- ness of Stock	Width of Stock	Length of Stock	Thick- ness of Blade	Width of Blade	Length of Blade inside Stock	Total Length of Blade
in.	in.	in.	in.	in.	in.	in.	in.
2 3 4 5 6 8 10 12 18 24 30 36 42	5/16 3/8 3/8 7/16 1/2 5/8 3/4 7/8 1 1-1/4 1-1/2 1-3/4	5/8 3/4 3/4 7/8 1 1-1/4 1-1/2 1-3/4 2-1/2 2-1/2 3-1/2 3-1/2	1-7/8 2-1/2 3 3-1/2 4 5 6 7 10 13 15 18 21	1/15 1/16 1/16 1/16 1/16 1/16 3/32 5/32 5/32 3/16 3/16 3/16	5/8 3/4 7/8 1-1/4 1-1/2 1-3/4 2-1/2 2-1/2 3-1/2	2-1/4 3-1/4 4-1/4 5-1/4 6-1/4 8-1/4 12-1/4 18-1/4 21-1/2 27 32-1/2 38-1/2	2-7/8 4 5 6-1/8 7-1/4 9-1/2 11-3/4 14 20-3/4 30 36 42
9	3/4	1-7/16	5-1/2	1/8	1-1/2	9-1/4	10-3/4

Also: A

7.00
9.00
30.00
40.00
50.00
75.00
95.00



DeWitt

Up to 12" each square is supplied in a strong wooden box. Larger than 12" squares are supplied in strong wooden sheaths.

These Squares have been introduced to meet the demand for accurate tools for use by the engineer on production work. The square blades are hardened and tempered. As a Square of this accuracy is a delicate instrument, each one is packed in a separate wood box, and we believe that this will be appreciated by those engineers who take pride in their tools.

EQUIPMENT CORP.

188-190 Elizabeth Avenue (8, NEW JERSEY

NEWARK 8,

Use postpaid card. Circle No. 235

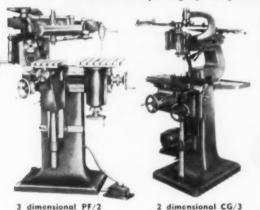
MACHINE and TOOL BLUE BOOK

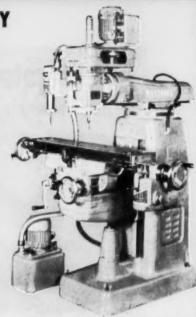
OUTSTANDING NEW MACHINERY AT LOWER COST!

\$1. BUYS ANY MACHINE upon termination of 3 Year Rental Plan.

UNUSUAL HIGH PRECISION

PEAR 3 and 2 dimensional pantograph engravers



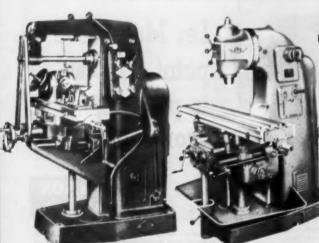


CONTOUR MILLER with hydraulic high speed vertical duplicating head. \$3,190.

PEDERSEN MILLING MACHINES

\$1,495.

\$2,695.



PEDERSEN UNIVERSAL TOOL & CUTTER GRINDER, MODEL U.S.L. Main spindle relad at 3,800 to 5,750 RPM. 361/3" x 51/3" table working surface.

\$2,695

VPU-0 \$2,595. V

VPV-2 \$6,590.

AARON MACHINERY CO., INC.

Dept. B • 45 CROSBY ST., NEW YORK 12 • WA 5-8300

Branches: Buffalo, N. Y., Mineala, N. Y., Los Angeles, Calif.

TERMS

Investigate Production Savings

made possible by Denison's 1-Ton Multipress



No scrap Riveting electrical controls in bakelite cases with the 1-ton Multipress has virtually eliminated breakage for Therm-O-Disc, Inc., Mansfield, Ohio. The press ram automatically reverses when the pre-set pressure of 900 pounds is attained.



Twice the output Three 1-ton

Multipresses are used for broaching,
burnishing and stripping operations at
Lamson & Sessions, Cleveland, Ohio.
Production was doubled over previous
methods; pinpoint accuracy is obtained
with semi-skilled operators.



Higher quality Peening studs less than 36" long was a ticklish job made easy by the 1-ton Multipress.

Health-Mor, Inc., Cleveland, Ohio, manufacturer of vacuum cleaner parts, has found that ease of Multipress operation greatly improves product quality.

Let Multipress point the way to production economy



For complete information, write:

DENISON ENGINEERING DIVISION

American Brake Shoe Company 1246 DUBLIN ROAD - COLUMBUS 18, OHIO

Use postpaid card, Circle No. 237

MACHINE and TOOL BLUE BOOK

Compare design then compare price

.. 404 11

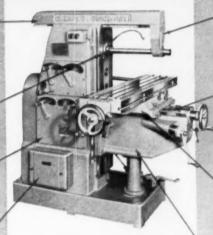
DESIGNED FOR ACCURACY

Overarm casting is rigid, boxlike structure: dovetail planed to perfect alignment with spindle.

Spindle and intermediate shafts jig bored for accurate alignment: mounted on over-size Timken bearings.

Heavy ribbed, box type, column casting assures rigidity.

Drive-5 HP 4750 RPM motor through multiple Vebelt and dependable gear train; sliding gears in column are flame-hardened. mounted on spline shafts and are flooded with oil supplied by gear pumps with built in filter.



Wide range of speed-feed combinations for every class of work. Rapid traverse speeds operation. Husky arber support has built-in oil reservoir, ediustable bronze bushing.

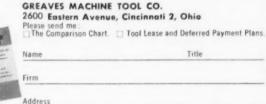
All sliding surfaces hand scraped to a bearing with mating member and with master gouges.

Line boring of table and saddle together after scraping assures proper alignment, provides free-running lead screw.

Knee is machine lig bored for ascurate alignment. All units are indicator tested during assembly to meet established alignment for milling machines.

Title

- Rugged Greaves Mills are accurate and dependable, yet sell for thousands of dollars less than comparable machines.
- Make your own comparison. Send for free copy of Greaves Comparison Chart,



new

feature

Ross-air control Longe



WHITE STAR SPOOL SOLENOIL



GOLD STAR DILIMMERSED SOLENOIL



BLUE STAR MY



BLUE STAR



BLUE STAR V

match any head t

Tests indicate a trouble-free life of over 25 million cycles for valves with the spool solenoid pilot section, and more than 40 million for all other Starline valves shown. Heads and bodies are completely and instantly interchangeable.

Sizes from $\frac{1}{4}$ " to $\frac{1}{4}$ ". Even more Starline models coming

later. Write for Starline data file.

Use Postpaid Card, No. 239



acts

Starline valve series life

any valve body!

WAY LLY OPEN NORMALLY CLOSED NORMALLY OPEN









A Galaxy of New Air-Control Stars Are Coming Your Way From

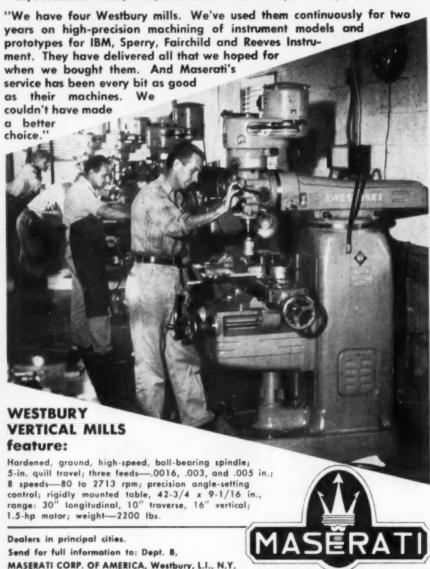
PERATING VALVE COMPANY

EAST GOLDEN GATE AVENUE

DETROIT 3. MICHIGAN

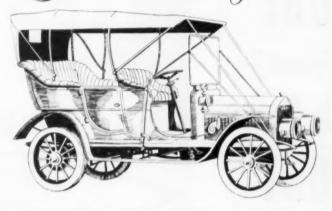
"FINE MACHINES, EXCELLENT SERVICE . . . "

-says Alexander Kahn, Pres., Arcs Research & Development Corp., Bellmore, L. I.



Great in its day ...

surmania dikulah da debeleh dan beberapa da karasaria da persisera



BUT WOULDN'T YOU <u>RATHER</u> HAVE THE LATEST TECHNICAL ADVANCE?



announces a great new advance in tool technology

new G G Tempered

nucut

"Tob Tempered"

Hack Saws

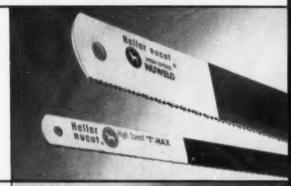
nucut

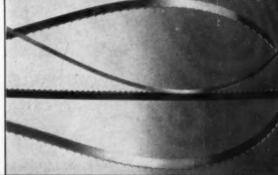
"Job Tempered" Metal Cutting **Band Saw Blades**

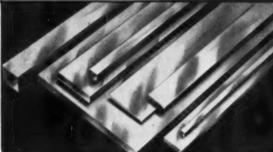
nucut

"Job Tempered"

Flat Ground Die Steel







OIL HARDENING AND AIR HARDENING TYPES The Analysis Recommended by **Leading Consulting Metallurgists**

Tools

Heller, famous since 1836 for superior files and tools announces an exciting new development — JOB TEMPERING. This significant advance in tool metallurgy and heat treatment has been applied to a great new line of Heller Tools that lick the toughest jobs in the shop.

Certified by American Standards Testing Bureau to meet their Standards Prescribed for Superior Cutting — Uniform Teeth, Uniform Set and Uniform Temper.

HELLER announces a new line of JOB TEMPERED Hack Saws — power and hand types — that will solve your cutting problems more efficiently and economically than ever before.

Power Saw Blades: High Speed "M"-HAX, High Speed "T"-HAX or shatterproof "NUWELD" Blades.

Available in all standard sizes and tooth spacings and packaged in attractive boxes 10 blades to the box.

Hand Saw Blades: Standard Steel, High Speed "M"-HAX or High Speed "T"-HAX either Hard Edge or All-Hard. Furnished in all standard lengths and tooth spacings. Packed in lots of 100 in attractive design packages.

Certified by American Standards Testing Bureau to meet their Standards Prescribed for Superior Cutting — Uniform Teeth, Uniform Set and Uniform Temper.

Heller JOB TEMPERING has been applied to a new tull line of Metal Cutting Band Saws that cut better, and last longer on the job.

Heller JOB TEMPERED Hard Edge Blades are offered in all tooth shapes . . . Standard Tooth (regular or wavy set); Skip Tooth and Hook Tooth.

Saws are available in all standard widths and tooth spacings in 100' and 250' coils or welded to specified lengths to fit all machines.

High Speed Steel Band Saw Blades are also furnished for specific applications.

Here is a great new line of JOB TEMPERED die steel having an analysis recommended by leading consulting metallurgists. It has excellent machining characteristics and when tempered to Heller's Heat Treatment Instructions, produces a true JOB TEMPERED tool or die that will give really superior job performance.

It is available in both air and oil hardening types, precision ground to a surface finish of 25-35 micro-inches, with all decarburization and surface defects removed.

Oil Hardening Flats and Squares are available in standard stock lengths of 18" and 36" and in a full selection of widths ranging from ½" to 14" and thicknesses from 1/64 to 2" Squares up to 3".

Air Hardening Type Flats and Squares are available in standard stock lengths of 36" thicknesses from 1/8" to 2" and widths from 1" to 10". Squares up to 3".

Special sizes of both types available on order.

GIVE US YOUR TOUGHEST

We'll be glad to show you how the right JOB TEMPERED Heller Hand or Power Hack Saw, or Band Saw Blade can solve it with faster, smoother, trouble-free cutting over a longer service life.

HERE ARE THE FACTS!

If your tooling problems involve hand or power hack saw blades, band saw blades or flat ground die steel, there's a **Heller Catalog** that can show you how to solve it. There's plenty of useful information in each one to help you select the right JOB TEMPERED Tools.





America's oldest file manufacturer
Newcomerstown, Ohio
A subsidiary of

Simonds Saw and Steel Co.

DISCOVER THE "difference"

in

DIE LIFE

WITH PRESS-RITE POWER PRESSES



Rugged reinforced high tensile semi-steel frame with full V adjustable gibs keeps dies correctly aligned assuring accuracy and longer die life. Built-in steel tie rods on all capacities 45 ton and larger.

Why risk the life of your expensive dies? When you put your dies in a PRESS-RITE Punch Press, you will have complete confidence that you will get more pieces per die, greater accuracy and less die maintenance. Discover the differences in PRESS-RITE design. Let us show you how to get longer runs before grinding dies. Ask your PRESS-RITE distributor or write:

PRESS-RITE DIVISION

SALES SERVICE MACHINE TOOL COMPANY

2357 University Avenue

Minneapolis 14, Minn.

Used by more . . . for more production

PRESS-RITE

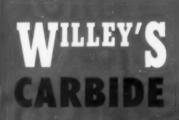
OPEN BACK . INCLINABLE Power Presses

Use postpaid card. Circle No. 243

30 standard

models 2 to 85 ton

capacity







tungsten titanium tantalum

Job-Engineered Carbide for every machining need.

STOCKED STANDARD BLANKS STOCKED STANDARD TOOLS STOCKED STANDARD INSERTS

"Thro-Away" Inserts

"Thro-Away" Insert holders

SPECIAL FABRICATOR BLANKS



Write for illustrated carelog & Price List.



WILLEY'S CARBIDE TOOL COMPANY

1340 WEST VERNOR HIGHWAY DETROIT 1, MICHIGAN WOODWARD 1-9444



The winner and still champion after fifty years is Crucible's REX high speed steel. And now it's better than ever! Recent improvements in manufacturing processes have given even higher quality and greater uniformity to every one of its properties.

Why not shop test the new REX yourself? Test it for size, structure, response to heat treatment, fine tool performance. Give it any test you wish. You'll see why it is today, as it has always been — the standard by which all other high

speed steels are compared.

Ask for REX by name at your local Crucible warehouse. Or order it directly for prompt mill delivery. And for information on REX, and the other Crucible special steels, send for the Crucible Publication Catalog. Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.

CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America

"WALES Strippits CUT OUR DIE-MAKING COST OVER 30%!"



"Die building was speeded up and costs cut when we standardized on Strippits replacing conventional die springs. Strippits eliminated counterboring for springs or stripper bolts, which also permits use of lighter die shoes. Only light stripper plates are necessary. For many dies, the even pressures and positive lengths of the Strippits eliminate the need for stripper plates or pressure pads allogether."

Production shops, too, benefit from Strippit-equipped dies. No need to remove dies from your press for costly disassembly to repair broken punches or springs. See illustration. Each Strippit is factory adjusted, tested and locked to assure perfectly uniform preload and stripping force. A complete line of Strippits is available from stock to meet all of your requirements, instantly and economically.

WALES trippit COMPANY
"...the Wales-Way is the PLUS-PROFIT way"
AKRON, NEW YORK

WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONT.



SEND FOR BULLETIN No. 17A

The STRIPPIT story should interest you. Send for your copy today.

see wan kinemaa's most modern power

SHEAR USERS EVERYWHERE TELL THEIR STORIES OF NIAGARA BENEFITS.

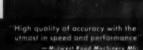
(3 of 19 Photo-Reports shown in Niagara's new Bulletin 69G)



an exceptional machine value



For over 10 years ... we have never had any downtime for repairs and maintenance — V. Beir Rulley and Coster Mr.





squaring shears can do for you!

Speed that spells peak productivity! Accuracy for cutting within micrometer tolerances! Ruggedness to stand the gaff on stiffest assignments! They're all yours with a Niagara Power Squaring Shear. New, fact-filled 74-page Bulletin is profusely illustrated to show you how and why:

From mass producers, fabricating plants, steel warehouses and sheet metal shops comes written evidence of the superiority of Niagara Underdrive Squaring Shears on jobs of every description. No other shear can match Niagara's record for cutting accuracy, speed and downright economy of operation.

For a photo story of the many tangible ways in which a Niagara Power Squaring Shear can boost hourly output, improve quality and slice maintenance costs in your plant, make sure that you receive Niagara's newly-published Bulletin 69G by mailing the coupon below. Presenting the greatest shear story ever told this 74-page document will give you a close look at Niagara Shears in numerous applications ... the closest look you have ever had at any shear, next to having it on your own floor! It will show you feature-by-feature why a Niagara Shear is far ahead at every point of comparison ... and why it pays to look to America's oldest leading shear manufacturer for the most profitable answers to your requirements.

NIAGARA-DEVELOPED FEATURES PROVIDE THE ULTIMATE IN MODERN SHEAR PERFORMANCE

(Here's a glimpse at just a few of many. See them ALL in new Niagara Bulletin 69G)



Fully Closed Box Type Construction



Massive Bed Designed for Super Strength



Instantly Engaging



Powerful Self-Compensating Holddown

YOURS FOR THE ASKING.

the most comprehensive shear bulletin ever published!

Months in preparation, this fact-filled bulletin now gives you valid, inside facts on the nation's top line of power squaring shears. 74 pages! 141 revealing photographs and illustrations! Specifications for nearly five dozen standard models! Capacities: 16-gage to 1" mild steel. Cutting lengths: 4 to 20 ft. Make sure that you receive a copy at once. Mail the attached coupon today.



NIAGARA MACHINE & TOOL WORKS . BUFFALO 11, N.Y.

your new Underdrive Squaring Shear Bulletin 69G to us immediately.

NAME
TITLE
COMPANY

ADORESS



Webber CROBLOX

(Solid Chrome Carbide)

In precision manufacturing it is vitally important that the original accuracy of gage blocks be permanent. Ordinary steel blocks, as the result of natural wear. inevitably become unreliable. resulting in imperfect production. Frequently this means heavy monetary loss.

Steel blocks cost less to buy, but naturally their useful life is many times shorter than the diamond-hard Croblex, Webber Croblox will last from twenty to fifty times longer than standard steel. You can be sure of production accuracy year after year.

In the long run, CROBLOX, based on length of service, are the lowest price gage blocks money can buy.

Would you like more information about CROBLOX? Just drop us a line and we'll send it at once.

12905 Triskett Rd. Cleveland 11, Ohio

cincinnati 76° royal



Cincinnati Royal Drills are built in 16" and 18" sizes in bench, floor and multiple spindle models. Also builders of 16" Sliding Head Bench and Floor Drills, 21" Sliding

Bench and Floor Drills, 21" Sliding and Stationary Head Floor Drills, 3'.7½" Radial Drills, and Cincinnati "Tray-Top" Lathes.



costs a little more - yet CHEAPER than the lowest price drill!

Yes, the new Royals are cheaper, because they stay accurate longer, stay on the job longer. They're metalworking drills, built by machine tool builders to machine tool standards.

For long-run economy, replace with the new Cincinnati Royals.

Contact the CL&T dealer in your area. He will give
you full details . . . often is able to make deliveries from stock.

For catalog data, write Cincinnati Lathe and Tool Co.,

3207 Disney St., Cincinnati 9, Ohio.

cincinnati lathes and drills

Does Your Shop Cut? These things?





This machine
can
Cut
and
Deburr
only
Wallace
makes one

44 page catalog - Gree - Write for it!

It describes

Wallace Cut-Machining Units
8 types - wide capacity range

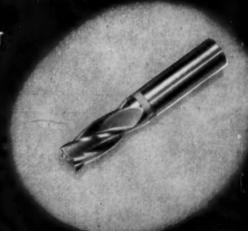
Wallace Supplies Mfg. Co. 1302 Wolfram Street Chicago 13, Illinois

new

electro-ground

carbide end mills

manufactured
by **ELGIN**



Eigin GOLDEN CIRCLE Carbide End Mills solid carbide, of course, for the toughest jobs. But most important, Elgin Golden Circle End Mills are ground by Elgin's new Electro-Grind process which completely eliminates the strains and grinding checks caused by conventional methods. No chance for chipped or flaked cutting edges caused by high temperatures during grinding!

Electro-Grind combined with the use of extra fine grit wheels gives the sharpest, smoothest cutting edges yet—your assurance of the highest quality tools obtainable, increased production, less frequent regrinding, greater accuracy.

Write for new catalog showing complete line of solid carbide end mills, drills, reamers and burs—in stock for immediate delivery.



Abrasices Division

ELGIN NATIONAL WATCH COMPANY

ELGIN, ILLINOIS

District Managers MACHINE and TOOL BLUE BOOK

EASTERN DIVISION

Dan E. Reardon, V.P. in charge e/e Hitchesek Publishing Co. 55 West 42nd Street New York 36, N.Y. Telephone: LAckawanna 4-4528

CONNECTICUT Dan E. Reardon, V.P. Bex Ne. 1, South Glastonbury, Conn. Telephone: MEdford 3-7083

NEW YORK, N.J., MD., D. of C., EASTERN

EW YORK, N.J., MD., D. of C., EASIERN PA., DELA. Haymond J. Sietsema e/e Hitcheeck Publishing Co. 55 West 42nd Street New York 36, N.Y. Telephone: Lackawanna 4-4528 Home 1el: (Cedar Grove, N.J.) CEnter 9-4364

WAINE, N.H., VERMONT, MASS., R.I., LONG ISLAND, N.Y. Denald J. Leverich 49 Standish Rd. Stamford, Conn. Telephone: Davis 3-6156

CENTRAL DIVISION

SOUTHERN COOK COUNTY, ILL.:
SOUTHWESTERN OHIO, INDIANA
Heary J. Smith, V.P. In charge
c/o Hitchneck Publishing Co.
222 East Willow Avenue
Wheaton, Illinois
Telephone: WHeaton 8-3400

MICHIGAN, NORTHERN IND., NORTH-WESTERN OHIO William E. Jacobs 18055 James Ceuzens Alghway Detroit 35, Miehigan Telephone: Diamond 1-9825 NORTHERN ILL., NORTHERN COOK COUNTY, WISC., MINN., UPPER PENINSULA of MICH., & S. DAKOTA Robert G. Belinder 6/4 Nitchecook Publishing Co.

Robert G. Belinder
e/o Hitchcoek Publishing Co.
222 East Willow Avenue
Wheaton, Illinols
Telephone: WHeaton 8-3400
WESTERN NEW YORK STA'
PENNA.. EASTERN OHIO
RISID E. Heffred
1507 Edgefield Road
Cleveland 24.0 Die

STATE. WESTERN

Cleveland 24, Ohio Telephone: Hillerest 2-0189

WESTERN DIVISION

CALIFORNIA, ARIZONA Keith H. Evans 3723 Wilshire Boulevard Los Angeles 5, California Telephone: DUnkirk 8-2981

and
593 Market St. (Room 816)
San Francisco 5, California
Telephone: YUkon 2-4280
OREGON, WASHINGTON
Lloyd Thorpe
6133 Arcade Bidg.
Scattle 1, Washington
Telephone: Mutual 7525

HITCHCOCK PUBLISHING CO.

· Telephone WH 8-3400 ·

Wheaton, III.



- Super high speed steel greatly increases wear resistance.
- Special non-metallic surface treatment further extends life between sharpenings.
- Precision taper ground for maximum rigidity—faster, cleaner cuts.

The finest circular form tools and cut-off blades are made by Somma. Nation wide distribution.

Prices and name of local distributor on request.

TOOL CO., INC. 21 BROWN STREET, WATERBURY, CONN.

West Coast Warehouse: 576 N. Prairie, Hawthorne, Cal.

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY CARD

NO POSTAGE NECESSARY IF MAILED IN THE U.S.A.

Se POSTAGE WILL BE PAID BY

MACHINE and TOOL BLUE BOOK

READERS' SERVICE DIVISION

WHEATON, ILLINOIS

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY CARD

NO POSTAGE NECESSARY IF MAILED IN THE U.S.A.

SC POSTAGE WILL BE PAID BY

MACHINE and TOOL BLUE BOOK

READERS' SERVICE DIVISION

WHEATON, ILLINOIS

Advertisements 101 226 251 276 301 326 351 102 227 252 277 302 327 352 103 228 253 278 303 328 253	376 401 4			IPER RE	number	
802 227 282 277 302 327 352 808 228 253 278 303 328 253		426 451	476 51	01 525	551 57	
	377 402 4 378 403 4	427 452 428 453	477 56 478 56	92 527 93 528	552 57 553 57	
204 229 254 279 304 329 354 205 230 25 5 280 305 330 35 5	379 404 4 380 405 4	429 454 430 455	479 S	M 529 95 520	554 57 555 59	47
05 230 255 280 305 330 355 06 231 256 281 306 331 356 107 232 257 282 307 112 357	381 406 4 382 407 4	431 456 432 457	481 S	06 531 07 532	\$3.6 S0	Į.
08 233 258 283 308 331 358	383 406 4	433 458	483 54	06 533	\$58 58	3
10 235 260 285 310 115 300	385 410	435 460	485 5	10 535	500 50 500 50	5
112 237 262 287 312 137 362	386 411 4 387 412 4	437 462	487 5	11 536 12 537	561 58 562 58	
113 238 263 288 313 115 363 214 239 264 289 314 139 364	388 413 4 389 414	438 463 439 464	488 51 489 51	13 538 14 539	563 58 564 58	9
215 240 265 290 315 340 365 216 241 286 291 316 341 366	390 415 4 391 416 4	440 465 441 466	490 51 491 51	15 540 16 541	565 59 566 59	0
217 242 267 292 317 342 367 218 243 268 293 318 419 368	392 417 4 393 418 4	442 467	492 5	17 542	567 59	Ž.
219 244 289 294 319 344 369	394 419	444 469	494 51	19 544	569 59	
221 246 271 296 321 346 371	396 421	446 471	496 5	21 546	571 59	
223 248 273 298 323 349 373	398 423	448 473	496 5	23 548	573 59	
28 250 278 300 325 150 375	400 425 4	449 474 450 475	500 5	24 549 25 5 50	574 59 575 60	
Inside Front Cover	Inside Back	Cover C 2D	Back Co 3A 3B	ver 3C 1	D	
STORES THE STORES OF STREET	W 1275 B 1275	0000				
Company						
		Pos	ition		•••••••	
Name						
						100
Street						
Street						
Street						
Street		Zone		State	••••••	
Street		Zone		State	••••••	
CityFebruary, 1957 For free inform	ation use	Zone	estage-	State	tion Card	ds
Street		Zone	estage-	State	••••••	ds
CityFebruary, 1957 For free inform	ation uso	Zone	ostago-	State	lion Card	ds
February, 1957 For free inform Free Literature circle key numbers 1 11 21 31 41 51 61 71 2 12 22 32 42 52 62 72	ation uso Now Produ 81 91 1	Zonee these p	estage-	free Act	tion Card	ds ····
February, 1957 For free inform Free Literature circle key numbers 1 11 21 31 41 51 61 71	Mow Produ 81 91 1 82 92 1 83 93 1	Zono e these p sets 001 111 1 02 112 1 03 113 1	estage-	State free Act circle 141 15 142 15 143 15	key number 1 161 17 2 162 17 3 163 17	fs
February, 1957 For free inform Free Literature circle key numbers 1 11 21 31 41 51 61 71 2 12 22 32 42 52 62 72 3 13 23 33 43 53 63 73 4 14 24 34 44 54 64 74	Mow Produ 81 91 1 82 92 1 83 93 1 84 94 1	Zone e these p sets 101 111 1 102 112 1 103 113 1 104 114 1	estage 121 131 122 132 123 133 124 134	circle 141 15 142 15 143 15 144 15	key sombo 1 161 17 2 162 17 3 163 17 4 164 17	is 11 72 73
February, 1957 For free inform Free Literatura circle key numbers 1 11 21 31 41 51 61 71 2 12 22 32 42 52 62 72 3 13 23 33 43 53 63 73 4 14 24 34 44 54 64 74 5 15 25 35 45 55 65 75	Mow Produ 81 91 1 82 92 1 83 93 1 84 94 1 85 95 1	Zone e these p sets 101 111 1 102 112 1 103 113 1 104 114 1 105 115 1	estage- 121 131 22 132 123 133 124 134 125 135	State free Act circle 1 141 15 142 15 143 15 144 15 145 15	key number 1 161 17 2 162 17 3 163 17 4 164 17 5 165 17	fs
February, 1957 For free inform Free Literatura circle key numbers 1 11 21 31 41 51 61 71 2 12 22 32 42 52 62 72 3 13 23 33 43 53 63 73 4 14 24 34 44 54 64 74 5 15 25 35 45 55 65 75 6 16 26 36 46 56 66 76	Now Produ 81 91 1 82 92 1 83 93 1 84 94 1 85 95 1 86 96 1	Zone e these p sets 101 111 1 102 112 1 103 113 1 104 114 1 105 115 1 106 116 1	121 131 22 132 23 133 124 134 125 135 126 136	State free Act circle 1 141 15 142 15 143 15 144 15 145 15 146 15	key number 1 161 17 2 162 17 3 163 17 4 164 17 5 165 17 6 166 17	is on 11 172 173 174 175 176
February, 1957 For free inform Free Literatura circle key numbers 1 11 21 31 41 51 61 71 2 12 22 32 42 52 62 72 3 13 23 33 43 53 63 73 4 14 24 34 44 54 64 74 5 15 25 35 45 55 65 75 6 16 26 36 46 56 66 76 7 17 27 37 47 57 67 77	Now Produ 81 91 1 82 92 1 83 93 1 84 94 1 85 95 1 86 96 1 87 97 1	Zone e these p cets 001 111 1 02 112 1 03 113 1 04 114 1 05 115 1 06 116 1	estage- 121 131 22 132 123 133 124 134 125 135 126 136 127 137	State free Act circle 1 141 15 142 15 143 15 144 15 145 15 146 15 147 15	key number 1 161 17 2 162 17 3 163 17 4 164 17 5 165 17 6 166 17 7 167 17	ris 11 172 173 174 175 176
February, 1957 For free inform Free Literatura circle key numbers 1 11 21 31 41 51 61 71 2 12 22 32 42 52 62 72 3 13 23 33 43 53 63 73 4 14 24 34 44 54 64 74 5 15 25 35 45 55 65 75 6 16 26 36 46 56 66 76 7 17 27 37 47 57 67 77 8 18 28 38 48 58 68 78	Now Produ 81 91 1 82 92 1 83 93 1 84 94 1 85 95 1 86 96 1 87 97 1 88 98 1	Zone e these p cets 001 111 1 02 112 1 03 113 1 04 114 1 05 115 1 06 116 1 107 117 1 108 118 1	estage- 121 131 22 132 123 133 124 134 125 135 126 136 127 137 128 138	State free Act circle 141 15 142 15 143 15 144 15 145 15 146 15 147 15 148 15	key number 1 161 17 2 162 17 3 163 17 4 164 17 5 165 17 6 166 17 7 167 17 8 168 17	is 11 172 173 174 175 176 177 178
February, 1957 For free inform Free Literatura circle key numbers 1 11 21 31 41 51 61 71 2 12 22 32 42 52 62 72 3 13 23 33 43 53 63 73 4 14 24 34 44 54 64 74 5 15 25 35 45 55 65 75 6 16 26 36 46 56 66 76 7 17 27 37 47 57 67 77	Now Produ 81 91 1 82 92 1 83 93 1 84 94 1 85 95 1 86 96 1 87 97 1 88 98 1	Zone e these p cets 001 111 1 02 112 1 03 113 1 104 114 1 105 115 1 106 116 1 107 117 1 108 118 1 109 119 1	estage- 121 131 22 132 123 133 124 134 125 135 126 136 127 137 128 138 129 139	State free Act circle 1 141 15 142 15 143 15 144 15 145 15 146 15 147 15 148 15 149 15	key number 1 161 17 2 162 17 3 163 17 4 164 17 5 165 17 6 166 17 7 167 17 8 168 17 9 169 17	fs 11 12 13 14 15 16 17 17 18 17 19

February, 1957 For free infe



Vertical range over 10" allowing operations on complete chassis, cabinets or other bulky objects. Ruggedness, stability and precise accuracy, inherent in construction.

Sounted on the Green Engraver Bench, ruggedly constructed of heavy duty steel, this D-2 compact unit provides a highly efficient pantograph engraver assembly.

this D-2 compact unit provides a highly efficient pantograph engraver assembly.

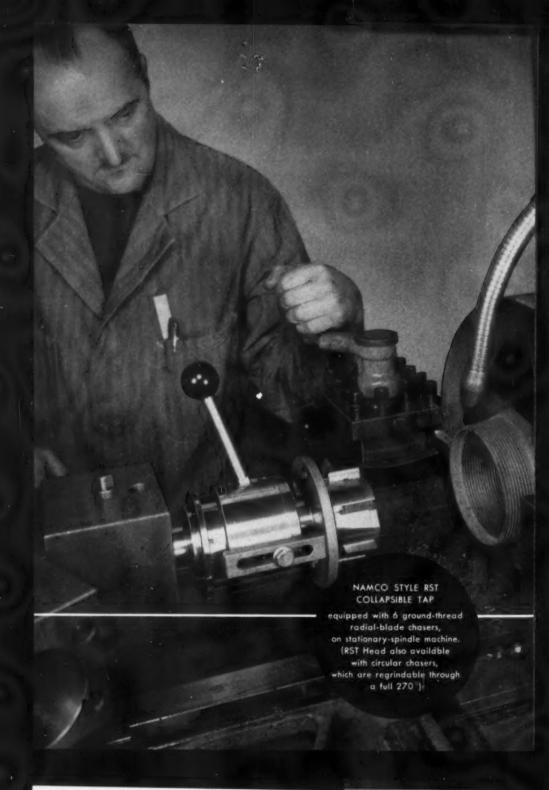
All functional parts are conveniently within teach of the operator while seated. Accessibility of master type sets stored in lower cabinet trays, tools and accessories contribute to productive capacity.

A brochure with full details is yours upon request.

Librature also available on the smaller Model 106 three dimensional engraver.

GREEN INSTRUMENT COMPANY

386A Putnam Ave., Cambridge, Mass.



Namco COLLAPSIBLE TAPS

(FOR ROTATING OR STATIONARY-SPINDLE MACHINES)

for smooth, clean thread form . . .

fine fit . . . uninterrupted tapping . . . on
long or short runs

POSITIVE PRECISION— Compact construction and unique core piece design assures rigid, full-length chaser support; heavy body supplies ample side support.

NO TIME LOST— Positive, trigger-like collapsing action at instant cut is finished eliminates drag... provides fast, unmarred threading on all types of horizontal or vertical machines, at maximum machining speeds.

ACCURACY EASILY MAINTAINED— Minimum number of parts, hardened and

precision-ground throughout, assures less wear—greater accuracy. Less down time because replacements are fewer and easier.

QUICK ACCURATE ADJUSTMENT for all diameters within range of head. One screw adjusts all chasers, simultaneously, to precise diametric requirement.

VERSATILE— Same RST Head can be used on either stationary or revolving-spindle machines.

A WIDE RANGE OF SIZES AND TYPES



Solid, adjustable.
Range 1 1/4" to 4".



With radial blade chasers. Range 1 1/4" to 4".



With circular chasers. Range 3" to 5".



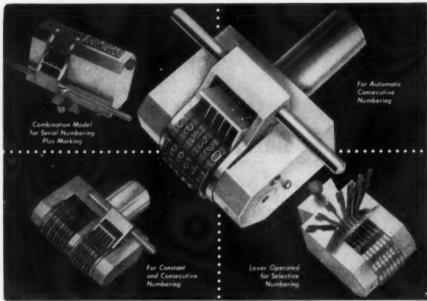
Style RES-L. Ranger With radial chasers, 23/4" to 4"; with circular chasers, 41/2" to 133/4".

For detailed information, ask for Bulletin DT-52

National Acme

THE NATIONAL ACME COMPANY, 177 EAST 131ST STREET, CLEVELAND 8, OHIO

SALES OFFICES: • Newark 2, N. J. • Chicago 6, III. • Detroit 27, Mich.



NOBLEWEST Precision Numbering Heads

Fast, accurate and dependable, Noblewest Numbering Heads are preferred by the leaders in industry. They have unlimited applications for constant, selective and consecutive numbering. Designed for use in either marking presses or Noblewest Roll Marking Machines—wherever permanent numbering is required. Available in a wide variety of automatic, non-automatic and lever operated models with number sizes from 1/40" to %". Special numbering heads are made to any requirements including embossing heads and numbering heads combined with marking dies. Write to Noble & Westbrook Manufacturing Company, 9 Westbrook Street, East Hartford 8, Conn.





"STRESS RELIEF ENDS TOOLING **GRIEF**"

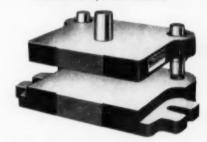
Want a die set where the dimensions "stay put"? If you do, then you want die sets built by Standard.

After completion of rough machining, all Standard catalog back post steel die sets are slowly heated to 1550°F., thoroughly soaked at that temperature for 3 hours, then slowly cooled back to room temperature, thereby removing all residual stresses.

RESULT: Then and only then can you have the assurance that the precision tolerances of the matching bored holes. the parallelism of the working surfaces, and the precise workmanship of

the tool and die maker - are not lost through instability of the steel itself.

STANDARD DIE SET MANUFACTURERS, INC. Providence 7, Rhode Island



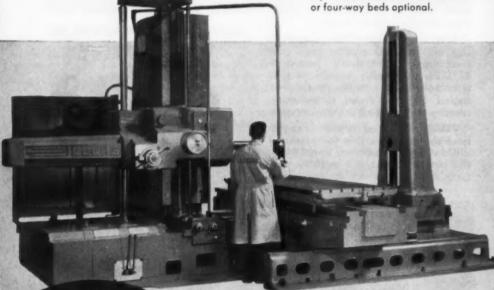
THERE'S A DIFFERENCE IN DIE SETS AND STANDARD MAKES THE DIFFERENCE!

MAIL	STANDARD DIE SET MFRS., INC.	Name
THIS	PROVIDENCE 7, R. I.	Company
NOW	Please send me your Comparison Chart Die Set Catalog CALL STANDARD FOR PROM	

there's always work for a Lucas

Extreme accuracy, feather-touch pendant control, automatic power positioning for repetitive work make a Lucas the most useful machine in any shop. There's a model and size for *your* horizontal boring, drilling and milling operations. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.

A complete range of models, built in 3", 4" and 5" spindle sizes with mechanical controls and in 4", 5" and 6" sizes with electrical controls. Wide variety of table and saddle sizes with two-or four-way beds optional.



LUCAS

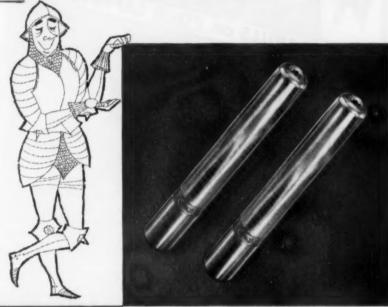
a division of
THE NEW BRITAIN MACHINE COMPANY

Other New Britain Machine Tool Divisions

New Britain-Gridley Machine Division
New Britain, Connecticut

Hoern & Dilts Division
Saginaw, Michigan

NEW Microme chrome plated guide posts





ON NEW DANLY DIE SETS

Now standard on all Danly precision die sets, MICROME chrome plated guide posts typify Danly leadership in die set design. These new posts are extremely hard and have very high resistance to wear. Super smooth finish helps to guarantee lasting precision performance. . they are another important reason why you should specify Danly die sets.



Complete new "leadership line" catalog

More than 200 pages provide you with complete design information, easier selection of die sets and supplies. Write for your copy today!



DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue Chicago 50, Illinois



The Van Keuren Co. laps optical flats to an accuracy of .000001", gage blocks to .000004", plug gages to .000010". Your job may not be this pracise, but it's a safe bet that VK skills can save you money on lapping problems involving size, flatness, parallelism or fine surface finish. If that tough production part has at least one gage characteristic, ask for a quotation from VK.

We lap flat and cylindrical work in both metals and non-metals. Sealing rings and plates for

pumps and pressure devices, precision pins, spacers, pistons, punches, carbide pivots, valve parts, instrument components and parts for lesting or inspection equipment, are among the customer items handled economically here in our plant.

If you require lapped or polished surface finishes in the order of .5 to 5.0 RMS, or dimensional tolerances from .000001" to .0001". The Van Keuren Co. can probably help on the problem. The "rule of thumb," as suggested above, is "at least one gage characteristic."



Send for a copy of the new, 258-page Van Keuren Catalog and Handbook No. 36 containing valuable technical and engineering information on measuring problems and methods. Address:



THE Van Keuren co.

177 WALTHAM STREET, WATERTOWN, MASS.

Optical Flats...Light Wave Equipment ...Light Wave Micrometers ...
38th YEAR Gage Blocks .. Wire Type, Taperlock and Trilock Plug Gages ... Master Setting Disks ... Thread Measuring Wires ... Gear Measuring Wires ... Carbide Plug Gages ... Carbide Plvots ... Precision Lapping Service





SUTTON TOOL COMPANY Dept. MTB 2 STURGIS, MICH.

IN THE OPERATOR'S HAND1001 DRILLING SPEEDS

--PLUS THE SMOOTHEST
OPERATION IN DRILL HISTORY!

The gearless variable speed drive in the new No. 1 "RPMster"-plus "Buffalo" craftsmanship-have brought a new smoothness and ease to drilling. The shift handle at left places the drive in high or low range, while the dial at right provides infinite variations in either range. They're easily reached, as are all controls on this 88" - high machine. Made in oneto-six-spindle pedestal models, the "RPMster" has long-life and accuracy features any shop man will appreciate—all moving parts including the precision spindle machined after heat treating to prevent warpage-hand scraped ways-"Buffalo" power feed-strong, rigid, stable base and frame-ample work tables-all parts carefully hand-fitted for permanent accuracy.

But you have to operate an "RPMster" to see why it's literally the finest value in vibration-free, variable-speed drilling available. Write for details on a demonstration at your "Buffalo" machine tool dealer's.





litil to an each

BUFFALO FORGE COMPANY

161 Mortimer Street - Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

PUNCHING

SHEARING

BENDING

DRILLING

Use postpaid card. Circle No. 273

MACHINE and TOOL BLUE BOOK

Magnaglo



protects your investment





You always get this...

not this

CIRCLE R quality in fine saws and other circular metal cutting tools is controlled—and cost is lowered—with Magnagla Inspection. For you, our use of this scientific method practically eliminates your down time due to usual defects in cutting tools.

Consult CIRCLE R Specialists in -

Burbank Chicago Cleveland Dayton Detroit Hackensack Indianapolis Kansas City Milwaukee Specialists in New York City Philadelphia Montreal Phoenix

Pittsburgh Providence Rochester St. Louis Westbury, L. I.



SEND FOR CATALOG

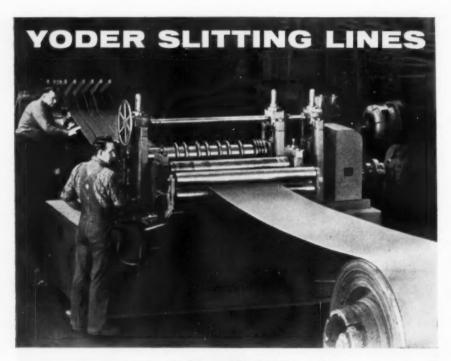


CIRCULAR TOOL CO., INC.

PROVIDENCE S. RHORE HAAND

Specialists in Circular Cutting Tools Since 1923

METAL SLITTING SAWS COPPER SLITTING SAWS SCREW SLOTTING SAWS COMMUTATOR SLOTTING SAWS FURLERS SLOTTING SAWS FULLER SLOTTING SAWS FOLION SAWS FOLION SHEAR BLADES • CIRCULAR SLOTTING SAWS • CIRCULAR SLOTTING SAWS • SOLIO & TIPPED TUNGSTEN CARBIDE SAWS • SOLIO & TIPPED TUNGSTEN CARBIDE SAWS • SOLIO & TIPPED COMBINED DRILLS & COUNT.



pay big dividends working only one day per week!



The Yoder Slitter Book is a comprehensive treatise on slitter operation and economics, with time studies, cost analyses and other useful data. It is yours for the asking.

In one plant, two Yoder tube mills and about 50 punch presses are being supplied with slit strands by one Yoder Slitting Line operated an average of only seven hours per week.

In another plant, a Yoder slitting line, operated from six to eight hours per week, is supplying two intermittently operated roll forming machines with total requirements averaging 100,000 feet per week.

These typical examples, demonstrate, first, the big potential output of a pelatively small, inexpensive Yoder standardized Slitting Line, and secondly, its big profitability. Assume production of only 35 tons of slit strands per 8 hour shift, one day per week, and the total per year would be 1750 tons. Estimating the saving in slitting cost at only one-half cent per lb., the total annual saving would be \$17,500.00.

Besides the big convenience of doing your own slitting, such savings will often repay the investment in a few months.

THE YODER COMPANY - 5509 Walworth Avenue - Cleveland 2, Ohio, U.S.A.



ROTARY SLITTING LINES COLD ROLL FORMING MACHINES ELECTRIC-WELD PIPE AND TUBE MILLS

Use postpaid card. Circle No. 275

MACHINE and TOOL BLUE BOOK

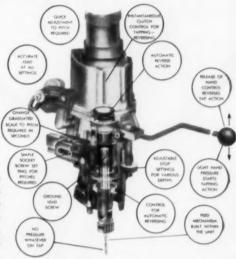
NEW Hawis adjustable pitch

2 models . . . Convertible to 11, 12, 13, 14, 16 18, 20, 24 and 28 pitch . . . 24, 28, 32, 36, 40, 44, 48, 56, 64, 72 and

80 pitch . . . in SECONDS!

Now, one attachment, one lead screw with quick simple adjustment gives convertible tapping in Seconds! Through positive leverage and clutch control, one lead screw running at constant speed, makes these new adjustable pitch lead screw tappers a must in every tapping department.

This is production economy—saves the cost of the individual lead screws for each pitch desired. Saves change over time—converts in a few seconds -by adjustment of four setscrews along a clearly marked graduated scale.



Tap with a feather touch on hand control . . . no pressure on the tap. Stops cut at end of predetermined depth. Automatically reverses upon release of hand control, automatically backs out, leaving clean, accurate threads.

Now, convertible pitch tapping, faster production, new versatility is assured even by unskilled operators—with this single tapping attachment.



Send for bulletin and prices.





Improved wear characteristics greater abrasive support

for bores up to 4"

This new Barnesdril Honing Tool design means more efficient honing operations because it supplies better abrasive wear characteristics and greater strength at the point of cutting. The tool has very few parts in its simple construction, and may be designed for use with either a floating or rigid fixture. Barnesdril wing-type abrasive stones are press-fit between standard hardened inserts which act as side supports for the stones as well as guides in the bore. Fiber jackets reduce stone wear by protecting the inserts against the abrasive and serve to hold the wing-type stones firmly in place.

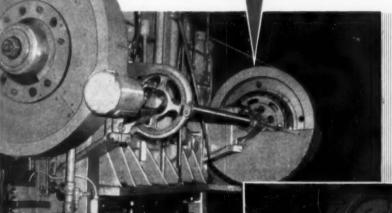
Fully protected by patents, this new honing tool will improve your honing operations and reduce honing tool costs on honing operations. See your BarnesdriL representative, or send us prints of your honing operations for recommendation.



BARNES DRILL CO.

882 CHESTNUT STREET . ROCKFORD, ILLINOIS DETROIT OFFICE: 3419 South Telegraph Road

faster, smoother production from FAWICA QUIPPED presses



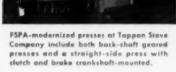
FAWICK Standardized Press Applications (FAWICK CB Airflex Clutch and CS Brake) are being used by Tappan Stove Company, Mansfield, Ohio, to obtain greater efficiency on three production-line presses. These presses produce a variety of parts—stove tops, oven doors, side panels—at speeds that vary from 300 up to 2400 strokes/hour.

The FAWICK Clutches and Brakes have required no maintenance. Responding instantly to electro-pneumatic controls, they improve cyclic operation and increase production speeds. In addition, the FAWICK-equipped presses are smoother and quieter than those having a mechanical clutch and brake.

The performance and productivity of all O.B.I. presses, new or old, can be improved with FAWICK Standardized Press Applications. For more information, ask your nearest FAWICK Representative or the Home Office for Bulletin ML-172.

FAWICK AIRFLEX DIVISION
FAWICK CORPORATION

9919 CLINTON ROAD . CLEVELAND 11, ONIO IN CANADA: FAWICK CANADA, LTB., TORONTO



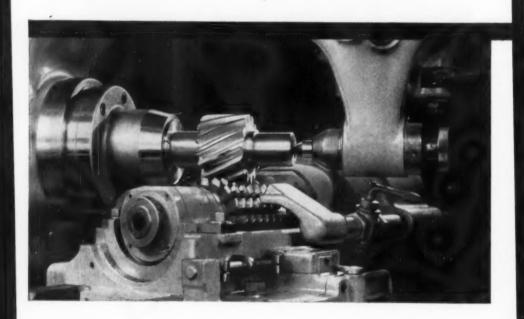


crown



hobbing

saves
time
and
cost
in
producing
accurately
crowned
gears



Crown-hobbing on this special Barber-Colman No. 14-15 Hobbing Machine is an ideal production method of generating crowned gear teeth. Where gears are now hobbed and then crown-finished in a secondary operation, they may be crown-hobbed in one operation. When a hobbed finish is satisfactory, the shaving operation can be completely eliminated. If the degree of finish required calls for a further finishing operation, such gears may be finished after crown-hobbing at less cost and in less time because hobbing provides uniform stock removal.

Crown-hobbing also makes it possible to hold a change in tooth thickness within the desired limits, and the tooth bearing can be located at the most desirable point consistent with the job conditions.

In the operation shown here, 4 DP., 14T, 18° P.A. transmission gears with 2¾" face are crown-hobbed on a special Barber-Colman No. 14-15 Hobbing Machine. Teeth are hobbed with a change in tooth thickness of .0045". The automatic cycle includes rough hobbing R. to L. at a given depth, automatic lowering of the work slide against the crowning cam, climb hobbing L. to R. at a constantly changing depth, and rapid traversing out of cut. No further finishing is required in this particular case, and the gears are completed in one automatic operation, without changing tools or transfer to other machines. Savings on this part can be expected on the basis of the following comparison:

typical gear-crowning

Rough hob gear teeth. Transfer to other machine. Semi-finish hob gear teeth. Transfer to next machine.

Crown-finish gear teeth.

crown-hobbing

Manually unload and load. Automatic cycle — rough hob. R. to L., set to finish depth, and crown hob L. to R. Manually unload and load.

The machine can be designed to suit your job requirements, either as a single-purpose machine, or as a universal machine for both crown and conventional hobbing. Parts can be hobbed in one or two cuts, depending upon specifications of the part. The cam can be designed to produce the tooth configuration required.

The machine required for crown-hobbing is provided with a cam mechanism for raising and lowering the work slide to produce a change in tooth thickness. The work slide is held against the rotary cam by hydraulic pressure in addition to its own weight. Change gears are provided in the cam drive so that different amounts of change in tooth thickness can be produced with the same cam.

Send us drawings of your crowned-gears. Our engineers will analyze the job conditions and make recommendations for crown-hobbing.

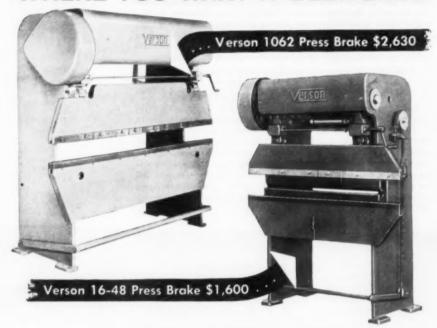
BARBER-COLMAN COMPANY

752 ROCK STREET . ROCKFORD, ILLINOIS

Hobs · Cutters · Reamers · Hobbing Machines · Hob Sharpening Machines



JUST TELL US WHERE YOU WANT IT DELIVERED



Immediate shipment from stock!

Standard Dies Also Available

Standard 90° 'V'
dies for these press
brakes are also avoilable from stack. 78"
long set for the 1062
is priced of \$136,00.
48" long set for use
in the 1062 or 16-48
is priced at \$102,00.
(Prices are for dies
to handle 16 ga.).

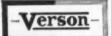
Verson 1062 and 16-48 Press Brakes are standard production items. You can have one from stock right now! No involved proposals, no long waits.

Standard Verson Model 1062, 16 ga. by 78" capacity, priced at \$2,630.00*; Model 16-48, 16 ga. by 48" capacity, is \$1,600.00*. Built to big brake standards, these power brakes are compact and low in cost, rugged and efficient in performance.

Call for a Verson Standard Press Brake today. Both are available from stock.

*Prices, F.O.B. Chicago, less dies; subject to change without notice.

ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION



VERSON ALLSTEEL PRESS CO.

9303 S. Kenwood Avenue, Chicago 19, Illinois 8300 S. Central Expressway, Dallas, Texas

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES . TRANSMAT PRESSES TOOLING . DIE CUSHIONS . VERSON-WHEELON HYDRAULIC PRESSES



It's the steel in ACE drill bushings!

TWO YEAR SECRET STEEL FORMULA ASSURES LONGER DRILL BUSHING LIFE...

If you are one of the many ACE drill bushing users who have told us about the extra-long bushing life you have been getting from our drill bushings—we thank you...and now we are going to tell you why!

More than two years ago ACE, without telling anyone and without raising costs, began making shipments of drill bushings made of a special high-carbon chromium bearing steel! With this new oil-hardening steel coupled with an exceptionally high degree of precision in the heat treat-

ing process, ACE engineers found that bushing life was increased tremendously. Rather than make an announcement at that time...we hoped that user comments would prove the importance of the new steel—and they certainly havel From all parts of the nation ACE drill bushing users have told us about the much longer life they have been getting...how production costs from both a material and labor standpoint have dropped sharply. Now...the secret is out...it's the steel!

Look to ACE for Quality... Accuracy...
Largest Deliverable Stocks Anywhere!

Write today for the all new catalog containing technical data, comparison tables, price lists and name of dealer in your area.



ACE DRILL BUSHING CO., INC. 5407 Fountain Ave., Los Angeles 29, Calif.

Quality Tool Hardening Routine PITTSBURGH SCREW & BOLT CORP.

"The Sentry Diamond Block Atmosphere Makes the Difference"



Pittsburgh's Sentry Furnace (shown below) hardens High Speed nut dies, pointing tools and High Carbon High Chrome trimming dies. Maintaining a constantly correct atmosphere, it "has eliminated decarburization, reduced grinding and finishing costs, increased life on dies and tools".

That's how the Sentry Diamond Block makes the difference . . . that's why Pittsburgh uses the Sentry Furnace for all quality tool hardening.





Request Catalog F-27: Write THE SENTRY CO., FOXBORO, MASS.



Punch Answers for Piercing Problems

On many punching operations, close center to center hole spacing in work and extremely fine tolerances must be held. R-B makes special retainer plates that will hold punches and die buttons exactly to your spacing specifications.

Any shape, size or number of punches and die buttons can be incorporated in the designing of your special R-B retainer plates. Also, ball locks are built into each special retainer to provide the same quick radial and vertical locking of punches and die buttons found in standard R-B retainers.

Special R-B retainer plates are made of tool steel which is precision ground after hardening. You will save skilled man hours in die construction and maintenance by using these multiple hole retainer plates: Result—more work completed each day and increased profits for you.





benchmaster

Built by press experts for production experts!

These accessories make press operations more automatic, eliminate unnecessary cost and get more work out per shift! You'll find them a big advantage on all Benchmasters and other presses, large or small!



KOIL KRADLES – Supplies a slack loop from which any machine can draw. Takes the drag off automatic feeding devices, increases feeding accuracy on progressive or multiple die operations; puts through more footage per hour. Many sizes: 1200 to 4000 lbs., 36" to 60" coil diameters, 10" to 28" widths. Larger capacities available.



ROTARY INDEX FEEDS—Converts your presses for automatically marking, crimping, assembling, reaming, trimming, etc., at speeds up to 6000 strokes per hour. Easy installation—4 bolt mounting. Two sizes: 12" or 15" tables, 10 or 12 stations. Larger sizes on special order.



KOIL KRADLE AND ROLL STRAIGHTENER COMBINATION - Straighteners also available as single units. Feed rate variable 25 to 100 rpm, straightener thickness capacity .200". Other sizes available.



AUTOMATIC FRICTION ROLL FEEDS—Lowest price on the market! Ideal for production work feeding small coil or strip stock. 3", 5", 7" and 9" roller widths. Two models, feeds adjustable from 0 to 3" cutoff or 0 to 6" cutoff. Plain, knurled or rubber covered rollers. Fits Benchmasters and other presses.



If your job is beyond the tonnage capacity of a single Benchmaster, investigate our Multiple Ram Presses...2 or more Benchmasters operating in tandem off a single crankshaft. You get more bed area, progressive die operation with individual die stations, lower die cost and easier die maintenance... at savings up to 50% in press cost!

When you need a SMALL MILL remember Benchmaster. One mill handles both horizontal and vertical milling jobs.

Takes an astonishing bite, yet holds close, precision tolerances.



FREE CATALOG

benchmaster

World's largest manufacturer of small punch presses and mills. 1835 West Rosecrans Gardena, California

Abrasive Cutting the only way to cut many the only way to cut some

the best way to cut many materials

Campbell Cut-Off Machines



Rough, serrated cut of metal saw

Smooth-finished cut of CAMPBELL Abrasive Cut-Off Machine with ALLISON Wheel

Smooth cutting saves grinding operation for American Gear & Mfa Co.

Cross sections of gear teeth-smooth. fine-finished and ready for metallurgical study-save an entire extra grinding operation at the Lemont, Illinois plant of American Gear & Mfg. Co., a division of Brad Foote Gear Company.

These test samples are neatly "sliced" down to a single gear tooth in thickness on a CAMPBELL 406 Oscillating Wet Abrasive Cut-Off Machine. equipped with just the right ALLISON Abrasive Wheel for the job. These sections with fine finish, no hard spots, no change in metallurgical characteristics, come from the WET cut with abundant coolant applied just where it does the most good. It's the oscil-LATION of the abrasive wheel . . . the right one for the job . . . that handles big cuts like this with speed and economy.

What is your metal cutting problem? Does it involve cutting of alloy or high carbon steel? Our Field Engineers, abrasive cutting specialists, can help you arrive at that particular combination of CAMPBELL Cut-Off Machines and ALLISON Cutting Wheels that will improve your operation and save you money.



Campbell Machine Division AMERICAN CHAIN & CABLE

937 Connecticut Avenue, Bridgeport 2, Connecticut





WIEDEMANN

TURRET PUNCH PRESSES

equipped with

DIRECT MEASURING GAUGE and TABLE

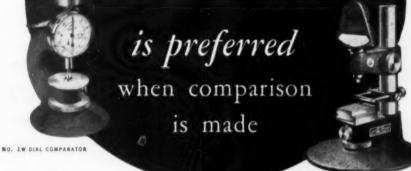


the ONLY Flexible Method of Locating and Piercing Holes of Many Sizes in LARGE WORK in ONE HANDLING

Write for Bulletin No. 500 D.M. Today

WIEDEMANN 4265 Wissehicken Ave. . P.O. Philadelphia 32, Pa.

AMES





MODEL 130 GP.

NA SE AMBLIEVING COMPANATOR

For fast, accurate measurements, Ames Dial Comparators are the choice of quality control men everywhere. You get definite, impersonal readings directly from the dial. There's no guesswork or figuring.

Special comparators are available for measuring resilient materials such as rubber, paper, etc., and for measuring non-yielding materials such as sheet metal, glass and plastic. Write for complete details.

Representatives in principal cities



28 Ames Street, Waltham 54, Mass.

MANUFACTURERS OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS

Use postpoid cord. Circle No. 286





inteRapid GROOVE CHECKING

Comparator Gauge

offers...

- * Precision, range and versatility
- ★ 3 and 2 point checking—3 point for production, 2 point for short runs
- Quick setting adjustment knob sets scale reading from gage blocks, mikes or ring gauge.
- ★ Locking lever locks arms after setting
- Retracting lever allows in and out movement of measuring arms while positioning instrument
- * Easily read large meter-type face is graduated in .0005".
- ★ Interchangeable tips offer versatility in application

The new P.D.Q. groove checking comparator gauge offers guaranteed Swiss accuracy and workmanship.

Sets come complete with both short and long groove tips, special "flat bottom" tips, button tips, centering arms, spare screws, special socket wrench and screw driver, all in one compact, sturdy case. Units measure internal grooves from 3/8" to 6"

Representatives in principal cities



the new comparator gauge

PORTAGE Double-Quick, Inc.

1037 SWEITZER AVENUE . AKRON 11, OHIO

FEATURES THIS MONTH

MACHINE AND TOOL

blue book

"We are focusing all the talent we can get in our organization upon planning the manufacturing operation" Donald C. Burnham, vice president in charge of manufacturing, Westinghouse Electric Corporation states in an exclusive interview. The techniques practiced at Westinghouse, including the use of 3-dimensional small scale models of plant layouts and details of the manufacturing laboratory are described in this 8-page feature. Page 92

Roundup of Washington News. A year-end survey conducted by 25 divisions of the Business and Defense Services Administration indicates most major industries anticipate good production and sales rates for 1957. Estimates are broken down for the Iron and Steel, Aluminum, Machine Tools and Automobile segments. Page 107

Stepped aluminum extrusions are growing in importance. While they have been produced mostly for the aircraft industry, other industries are becoming more aware of the economy when two parts can be combined in one with resulting savings in assembly, machining and basic material costs. This 9-page feature article is by C. J. Huffman, Kaiser Aluminum and Chemical Co.

Plate type jigs for low cost drilling. Tool design engineer Allan Young presents five types of plate or sandwich type jigs.

Page 129

Designing a fixture for milling oil grooves in bronze thrust plates. C. T. Bower points out that while great accuracy was not required, the problem entailed designing a fixture that was economical, easy to make and capable of taking other sizes of thrust plates.

Page 132

News of Automation. A new and versatile tape control system, Numill, makes standard machine tools fully automatic. Guided solely by instructions recorded by a standard electronic brain on magnetic tape and continuously monitored by automatic electronic gages, finished tools or parts can be manufactured without the use of blueprints.

Page 138

An extension bed gap lathe proves its versatility for machining to .0004" and for swinging large, odd-shaped parts in a Texas plant.

Page 146

How lathes are adapted to bore tubes and castings in a plant with short runs is described by H. Steel, general foreman of Clark Equipment Co., makers of lift trucks.

Page 186

LEADERS OF THOUGHT

MACHINE AND TOOL

blue book



"... when specific persons work full time on manufacturing planning, more progress is made, accomplishments are greater."

> —D. C. Burnham Vice President, Manufacturing Westinghouse Electric Corp.

Westinghouse insists on being "sure" with

More Emphasis on Planning

Q. What are the most pressing problems at Westinghouse today from a manufacturing standpoint?

A. Our biggest problem has been and probably always will be the development of skilled people in manufacturing: engineers, supervisors and people to plan, operate and control plant operations. To narrow down that problem, I would say we are much concerned with building up our manufacturing planning organization. As

SUBLAND TOOLS-

(Standard and Special)



Reduce SET-UP TIME,
Cut PRODUCTION COSTS

To produce more work in less time and at reduced costs, modern production methods often require multi-diameter tools that perform a combination of operations with each pass—drill-counterbore, drill-ream, drill-chamfer, etc. Your best bet for accomplishing these objectives are subland cutting tools, precision produced by Detroit Reamer & Tool Company.

A leading participant in the original development of subland tools more than 25 years ago, Detroit Reamer & Tool Company has been a major manufacturer of such tools ever since. Thus, our engineering experience combined with modern manufacturing facilities assure that you receive the finest quality subland cutting tools.



DETROIT REAMER & TOOL COMPANY

780 W. MAPLE RD. . P.O. BOX 174 . BIRMINGHAM, MICH.

"We focus all the talent we can get in our organization upon planning just how the various jobs should be done"

we improve our manufacturing operations they become more complicated in many ways. You can't have the tooling, equipment and the layout planned just by the superintendent who runs the job. Planning how the work is to be

done in the plant, where the equipment is to be located, the study of the flow of materials are jobs that require specialists.

Q. What techniques are you using to bring about improved manufacturing planning?

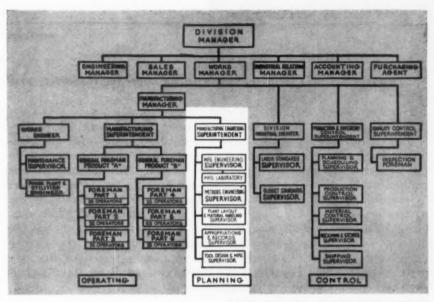
About Donald C. Burnham

Donald C. Burnham, an authority on industrial manufacturing techniques, joined the Westinghouse Electric Corporation as vice president in charge of manufacturing, May 17, 1954. He came to Westinghouse from General Motors Corporation, where he held the positions of manufacturing manager and assistant chief engineer of the Oldsmobile division.

Born in 1915 at Athol, Mass., Mr. Burnham was graduated from Purdue University in 1936 with a bachelor's degree in mechanical engineering. He joined General Motors on that company's graduate

student course and was assigned to the AC Spark Plug division, where he was engaged in manufacturing methods improvements. In 1938, he was transferred to General Motors' Ternstedt division, which manufactures automobile hardware, and assigned to manufacturing methods and plant layout. Mr. Burnham joined the Oldsmobile division in 1941.

During World War II, Mr. Burnham as an ordnance officer was assistant to the works manager of the Watervliet, N. Y., Arsenal. He is married and the father of five children.



TYPICAL DIVISION MANUFACTURING ORGANIZA-TION CHART for a Westinghouse operation. Emphasis today is on the "planning" function.

A. For one thing we make all layouts for new plants or major revisions in old departments in three dimensions. We make them up of small scale models, which is not new in industry, but we are applying it 100% to our planning. We consider it so important to figure ahead just how the jobs should be done that we focus all the talent we can get in our organization upon planning them. If we can get everyone's ideas in the planning stage, we can start those operations with good methods; we don't have to make revisions after the operation is underway. In the past, planning has often been a part time activity of supervisors or engineers whose major job was operating part of the plant. We find that when specific persons work full time on manufacturing planning more progress is made and accomplishments are greater.

Q. I'm sure your organization set-up will be interesting to a great number of our readers. Could we have more details?

A. Here is a chart showing a typical division manufacturing organization. (See illustration.) The field on which we're putting particular emphasis is the "planning" function. There we are grouping together

"If we get good ideas in the planning stage we'll start operations

the people who plan how the work is to be done. We have "manufacturing engineering" to determine the sequence of operations, the equipment and machines needed to perform the job. Incidentally, we are setting up pilot manufacturing laboratories in many of our divisions to more easily determine the sequence of operations, equipment required, etc. The methods engineers, of course, study the manual part of the job: the work the people have to do and how they are to do it most efficiently. As for plant layout, we look at it not just as a function of locating the machines and getting the right utilities to them. We feel plant layout is primarily a study of the flow of materials through the plant. The primary objective in plant layout is to get the equipment located most advantageously for the flow of materials and to carry out in the most economical way the operational sequence that the manufacturing engineer has recommended as well as the recommendations of the methods engineers. The planning activity also includes tool design, tool manufacturing and appropriations and records.

Of course, these men who are

planning future work ask personnel involved in the other manufacturing functions to participate in the planning. This includes the line supervisors, the industrial engineers who are going to set standards, the production control and quality control supervisors. All of the people involved in arranging the activity attend planning sessions that are often centered about the 3-D layouts.

Q. Would you go into a little more detail about the function of the manufacturing laboratories?

A. You can't always plan the way the job is to be done on paper at a desk, put it into the plant and have it immediately work right. Often some development work is required. And so, in a number of our plants, we have set up manufacturing laboratories where new ideas can be developed and the bugs worked out of them before they're put into production.

At Headquarters, in Pittsburgh, we have a relatively small Manufacturing Laboratory. This Laboratory develops manufacturing processes and equipment that are of interest to a number of Westing-

with good methods."

OBJECTIVE IN PLANT LAYOUT:

Get the equipment located most advantageously for the flow of materials and carry out in the most economical way the operational sequence recommended by the manufacturing and methods engineers.



house divisions, and where this development work is not available from suppliers. In the Metals Joining portion of this Laboratory, we are developing many welding applications for use in our divisions. For example, here is a weld made with a Westing-Arc welding machine using CO, gas to shield the arc. This weld was made at 120 inches a minute. After the application of the process has been worked out in the Laboratory, reports are sent to the divisions so that they can apply the process to their production work.

The Headquarters Manufacturing Laboratory is doing some work in the development of automatic assembly equipment. We find that we can buy machine tools to perform almost any operation but that it is difficult to procure the kind of automatic assembly equipment which we need. The assembly equipment is usually so specialized that it is necessary that a great amount of the development be done in our own laboratories.

Many of our products require rather complex electrical tests. These electrical testing operations lend themselves to automatic control, and both in our Headquarters Manufacturing Laboratory and in a number of the divisions, automatic testing equipment is being developed. Incidentally, practically all

"Automation? I look at it as being a logical step in a slow evolution."

the control work which is being done in connection with these newer methods in our Manufacturing Laboratory is being performed with static-type control devices instead of using relays and controls with manufacturing parts. We find that by using Cypak and other static devices in our control work in our Laboratory we get more reliability. This reliability is particularly needed in the automatic assembly and automatic test devices.

Q. How are the machine tool manufacturers helping you in this planning program?

A. We urge all divisions to get their problems solved by the suppliers of the equipment in every situation possible. Most of our problems, I'm sure, are solvable and are solved by the suppliers of our equipment. The only time we want to work on a problem is when we aren't able to get from them the kind of solution we think is needed. So I have a great deal of respect for what the outside supplier can do. I am convinced that

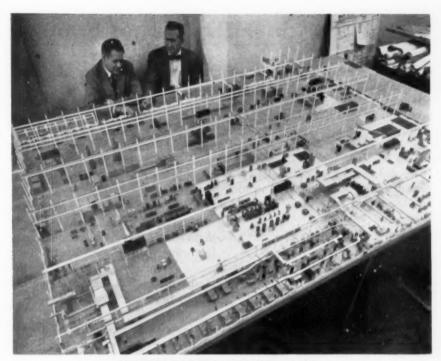
with these planning groups set up in our divisions we are better organized to deal with and take advantage of help from the suppliers.

Q. It appears that this emphasis on planning should also result in reducing your manufacturing costs. Has this been the case?

A. Yes, but we are planning our cost reduction work so it is a team effort. Sales, engineering, manufacturing, and purchasing all work together to get the best product at the lowest cost. We don't regard our cost reduction as a manufacturing activity. Manufacturing is just one factor in cost reduction. With team effort we think we are going to get much greater results than are obtained by each function working on just its own problems.

Q. Has this team effort speeded up the automating of your manufacturing facilities?

A. Yes, as engineering and sales have helped to standardize products and stabilize designs, we have been able to go further on automation. For example, when we



NEW PLANT TO DEVELOP 'TOMORROW'S METALS'

started a new small motor plant last year, the equipment used for producing the shaft was completely automatic. The bars of steel are put into a rack at one end of the line, and the shafts are cut-off, ground, milled and checked without being manually handled. Since the motor shaft design was standardized, except for length, and since the product is a stable one for which we expect a continuing market, we have no fear of this line of automatic production equipment becoming obsolete. It is possible to be too conservative in try-

This scale model shows the interior of the new Westinghouse Electric Corporation's metals plant at Blairsville, Pa. Examining the model of the multi-million dollar plant for the development and pilot production of new metal alloys and special castings are Warren M. Trigg, plant manager (right) and Lloyd L. Friend, supervising engineer in charge of construction (left). The 480-foot-long building has five manufacturing aisles with an office area across the front of the building (foreground). There are facilities for the basic metal-working processes of melting, forging, botrolling, cold-rolling, conditioning, pickling and heat-treating, and in addition, will be equipped for such newer foundry techniques as investment casting and shell-mold casting. Powered metal parts also will be manufactured.

ing new methods and new types of equipment. I would much rather obsolete a relatively new machine now and then, than to always use standard purpose equipment for fear that future design changes would obsolete a special machine. If we did not get rid of a relatively new machine occasionally, I would be discouraged because I would know that we were not going far enough in improving our methods and reducing costs.

Q. Where components in your shop are produced by automated lines, has this change, in most cases, been sudden or a gradual process?

A. I look at automation as being a logical step in a slow evolution. We have in our shops today examples of the various phases or steps through which we have progressed on our way to automation. There are four of these: (1) The job shop with the lowest volume and highest cost method of production; (2) progressive line manufacturing, where machines are arranged according to the work that must be done on the product; (3) conveyorized line manufacturing, where conveyors are used to carry parts from one machine to the other; and (4) automation, with its high degree of automatic handling and control. Changes toward automation have been gradual.

Q. Will there always be the job shop?

A. Yes, I believe there will always be a place for the job shop. New products will be coming along which will initially require very low volume production and on which the product design has not been stabilized. These products will initially require job-shop type of manufacturing. However, many products now made by job-shop methods can be raised to the next higher level-progressive line manufacturing. Many products now made on progressive lines can be made on conveyorized lines or by automation.

Q. How can the machine tool industry help to promote greater and wiser use of automation?

A. Most companies, like Westinghouse, have equipment replacement programs, but the machine tool industry should work hard at making present day machine tools obsolete. I hope we don't have to wear out our machine tools. My hope is that the machine tool industry makes them obsolete so we have to replace them with improved machines. The problem that should be of great concern to the American people today is not how to stem the tide of automation but how to bring it about more quickly.

another BAKER bonus



.. SERVICE IS A SNAP



Best in the long run Practical in the short run

Many reasons for Baker's twin pull hydraulic feed cylinders. They're out in the open . . . easily accessible for maintenance. Are more compact (3½" diameter). Have adjustable chevron packing. And they're exclusive with Baker. Twin pull can be had on Baker specials — or on Baker Basics, for automation with *standard* machines.



AUTOMATION

- () Twin pull hydraulic cylinders
- () Flame-hardened, ground steel or cast iron ways durable
- () Separate Porta-Pak power feed unit — accessible for maintenance
- () Big ball bearings throughout, rugged construction

BAKER BROTHERS, INC. Dept. MT-257, Toledo 10, Ohio

yes, tell me more about these Baker Bonuses . . .

NAME AND TITLE

ADDRESS

. . . CHECK AND MAIL FOR DATA

ZONE STATE

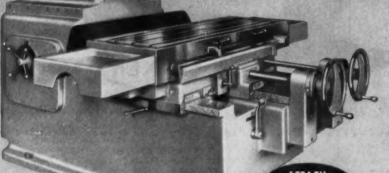
First Showing!

KNIGHT'S NEW NO. 60 Metalworking's most accurate, fast and VERSATILE VERTICAL

PRECISION BORING ... and MILLING

- Unusual extra capacity
- Solid table support
- Choice of 3 measuring devices
- . Big heavy bed-type table
- Extra cross & vertical travel
- · Easy simplified operation

Soud for brochers



TWO TABLE SIZES

 $18'' \times 52'' - 28''$ longitudinal travel $18'' \times 60'' - 36''$ longitudinal travel



W. B. KNIGHT MACHINERY CO.

3924 West Pine Blvd. . St. Louis 8, Mo.

ATTACH TO COMPANY LETTERHEAD

W. B. KNIGHT MACHINERY CO. 3924 West Pine Blvd., St. Louis 8, Mo.

Send complete information on new No. 60 Vertical.

Name.

☐ Have representative call.

AS THE EDITOR SEES IT

hlue book

More Efficient Use of Skilled Technical Personnel

If sound business management requires intelligent frugality to get a just return on all operations, it behooves management to give a look at one of their most valuable assets—tech-

nical personnel.

A quick survey of the way your skilled draftsmen and designers spend their time might astound you. How much time is spent acquiring information and on miscellaneous items not connected with their work? Could lower paid clerical workers do something in the way of collecting information and perform most of the routine chores for the designers and detailers? Even if this means that clerical personnel might be used inefficiently, by having much time to do these miscellaneous tasks, the important thing is to improve the overall efficiency of the drafting section.

Does the machine shop or production department need engineering drawings that include an over-repetitive use of dimensions, elaborate scale drawings and the unnecessary presentation of multiple views? Some 100 leading companies, including American Machine & Foundry, International Harvester, General Electric and IBM, think not and have instituted the practice of "simplified drafting" in their organizations.

"Simplified drafting" is a controversial subject with the main argument against it being that it promotes sloppy work. However, a close study of the 11 areas for simplified drafting propounded by A. M. and F.'s Jay Bergen will disclose that a draftsman will not only produce a cleaner drawing it will be less confusing. The shop gets what it needs to do the job. Existing staffs produce more finished drawings.

Mr. Bergen estimates the savings in drafting time at the company's Greenwich, Connecticut plant was over 35 per cent in 1955. He claims that if his company had been able to use simplified drafting methods on defense work the dollar savings would have amounted to \$720,000.

You are contributing to the shortage of competent draftsmen if you let them fritter away 25 to 35 percent of their time on non-productive work. Using lower paid clerical help to do the routine chores and simplified drafting to get more finished drawings out of existing staffs are two areas that should receive your serious consideration.

Paul A. Meline Managing Editor

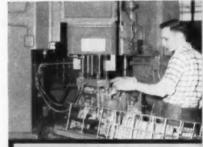
\$7200 per month saving by large automotive plant after switching to



An actual saving of \$7200 per month, including labor costs, has been reported by a large automotive transmission plant since switching to Stuart's Dasco D-20—the first truly heavy-duty soluble oil formulated and priced for general application!

ONE OIL FOR 365 DIFFERENT MACHINES—This carefully engineered compound eliminates cutting oil confusion—drastically reduces the number of cutting fluids needed in your plant. This plant uses economical Dasco D-20 in standard mixtures on 365 different machine tools—reducing cutting oil inventory...saving service time and cutting oil costs...minimizing chance of error—yet taking advantage of all lubricating and cooling properties you expect from a heavy-duty soluble oil.

RANCIDITY ELIMINATED—This user reports that Stuart's Dasco D-20 stays sweet longer—even after long shutdowns. Rancidity is actively resisted by a special germicide additive, the best of a very few germicides that remain effective in the presence of soaps. Stuart's Dasco D-20 has superior wetting ability—remains effective when mixed with water.



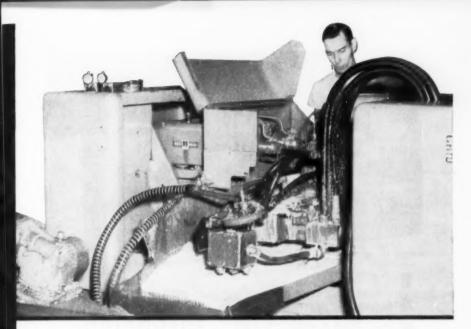
Chips settle faster with Stuart's Dasco D-20, so you have a clean compound in your machine at all times. You get a better finish...cooler cutting and grinding.



You can use low-priced Stuart's Dasco D-20 for reaming, boring, drilling, facing, chamfering, miling, tapping, threading, broaching, surface-grinding, and high-speed carbide tool machining.

For Cutting and Grinding

Stuart's Dasco D-20 maintains or improves efficiency of your cutting and grinding operations. A real heavy-duty emulsifiable oil, it forms a tough, thin film between the cutting tool and the work... reducing friction and preventing excessive heating. A wide variety of tough metal-cutting operations, including certain types of broaching, can be done with this one low-priced compound. A lean mixture for grinding enables you to take full advantage of improved wheel bonds. Properly applied, it allows you to use high-unit pressure for maximum stock removal... keeps wheels open and free-cutting... prevents heat checking.



First low-priced heavy-duty soluble oil with both additives: active germicide and E. P. base

Stuart's Dasco D-20 is the first low-priced soluble oil to offer you both a special antirancidity germicide and an extreme pressure base oil additive with high anti-weld and lubricity characteristics. Carefully balanced, high-quality emulsifying agents provide high-grade cooling properties . . . unusual stability for longer life. This multi-purpose, heavy-

duty soluble oil gives you ideal characteristics for high-speed machining with carbide cutting tools . . . upgrades finish and tool life on tool steel applications. Stuart's Dasco D-20 has superior wetting ability . . . avoids rust . . mixes easily . . . keeps machines and parts clean . . . and is preferred by operators because it has no skin irritants.



Phone your Stuart Service Center

Arrange now to test Stuart's Dasco D-20 on your difficult cutting and grinding jobs.

Representatives in all principal cities

SINCE 1865

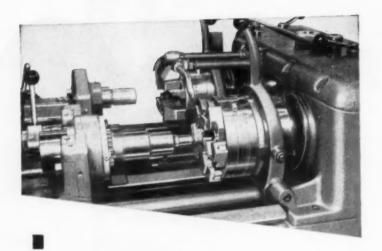
D. A. STUART OIL CO., LIMITED

2729 South Troy Street, Chicago 23, Illinois
CANADIAN D. A. STUART OIL CO., LIMITED

3575 Danforth Avenue, Toronto 13, Ontario



METALWORKING LUBRICANTS



34"-4.320" threading range...with one LANDMACO machine

The Twin Disc Clutch Company Hydraulic Division in Rockford, Illinois, is able to thread a wide variety of work from \(^34''-32\) pitch to 4.320''-12 pitch with just one LANDMACO Threading Machine.

A six-chaser 40RX LANCO Head with a range of $2\frac{1}{2}$ " to $9\frac{1}{2}$ " ($5\frac{1}{2}$ " bore) is mounted on the right-hand spindle to produce fine-pitch large-diameter threads. A $2\frac{1}{2}$ " R LANCO Head with a range of $\frac{1}{2}$ " to $2\frac{1}{2}$ " is used on the other spindle to produce coarse-pitch threads, small-diameter threads, and long thread lengths.

One of the many different operations performed by this equipment is illustrated—threading clutch output shafts with the 40RX Head. The workpiece is made from C1045 steel, heat-treated to 229-269 Brinnell hardness. A special 12-pitch UM. Thread, with a 3.699^-3.676" pitch-diameter tolerance, is cut .830" long to within $\mathbf{1}_k^{-\alpha}$ of the shoulder. 15 pieces are threaded per hour, including 100% inspection by gauging on the machine. Even with heat-treated material and exacting thread finish requirements, 100 pieces are completed between chaser grinds.

Special workholding fixtures (which may be used interchangeably with standard vises: are a major factor in the versatility of this equipment at Twin Disc. In the operation illustrated a special carriage front allows threading a workpiece with a diameter well beyond the normal range of the machine. Ask for Bulletin F-80 or F-90 (Die Heads)—H-76 (LANDMACO Machines).

LANDIS Machine COMPANY

57 WAYNESBORO · PENNSYLVANIA · U. S. A.

Use postpaid card. Circle No. 292

ROUND-UP OF WASHINGTON NEWS

MACHINE AND TOOL

blue book

Our chief economic problems are how to avoid excesses, especially with regard to cost and price increases and the use of credit, to alleviate downward movements where they have and will occur and prevent the spreading of their depressing influences, and to stimulate steady overall growth so that our standard of living may increase still further, particularly for those at the lower end of the income scale.

-Sinclair Weeks Secretary of Commerce

Democrats To "Go Along" With Ike in Coming Months?

Democrats in Congress have gone on record with the assertion that they differ little with President Eisenhower on foreign and domestic policies.

It appears that many Democrats take considerable pride in overriding the opposition of the isolationists. At this writing the Democrats are in accord to back the president to the hilt on opposition to income tax reduction, on antimerger curbs and Federal aid for school construction.

Since Secretary of the Treasury Humphrey has asserted that provisions against dumping of foreign merchandise in the U.S. at low prices should be tightened, the Congress can be expected to pass suitable legislation to give U.S. industry more protection.

U.S. Uranium Production Doubles in 1956

The U. S. output of uranium concentrate reached 8,000 tons in 1956, approximately twice the 1955 figure, the Atomic Energy Commission has announced.

At a recent meeting the American Nuclear Society discussed the possibility of generating electric power from hydrogen fusion. The consensus was that while it is possible, it will probably take 20 years to solve the many engineering problems involved in the task.

Year-End Survey Indicates Good Business Prospects

A year-end survey by the Commerce Department's Business and Defense Services Administration indicates that most major industries, barring an unforeseen international emergency, anticipate continued good production and sales rates for the first six months of 1957.

In some areas this prospect will depend upon the availability of production materials, particularly certain forms and shapes of steel for which demand exceeds production capacity.

Secretary of Commerce Sinclair Weeks said the survey was conducted by the 25 Industry Divisions of the BDSA, of which H. B. Mc-Coy is Administrator.

The BDSA estimates follow:

IRON AND STEEL: Prospects for the steel industry remain good through the first half of 1957. Demand for almost all products is at record level and promises to continue in view of increasing needs of business and government for capital goods and construction. Steel plates, structural shapes, and some types of tubular products are in short supply and though the steel industry expects to step up its expansion program very substantially in 1957, the tight supply situation

is not likely to be alleviated for some time to come.

Record steel requirements for machinery, construction, shipbuilding, oil and gas, and freight car building should keep the steel industry operating at capacity for the first half of the year. Demand for sheet steel for the automotive industry and other consumer durables is also expected to be higher than in the closing months of 1956.

This high demand comes at a time when consumers' inventories are reduced and out of balance as a result of last summer's steel strike. While the three-year labor contract may remove part of the incentive to carry high inventories, an increase in steel stocks is likely to be necessary for efficient operations.

ALUMINUM: Shipments of aluminum mill products and ingot to consuming industries are expected to reach new record levels in the first half of 1957, amounting to an annual rate of about 4.7 billion pounds. At that rate the first half

More than a half million air control valves were installed in industry during 1956. We anticipate a 1957 volume of about three quarter of a million.

—R. J. Cameron, President Ross Operating Valve Co.

Pressure within the steel industry for another round of price increases is building up, as labor and raw material costs mount, but a retarding influence is being exercised by a farsighted policy of not wanting to price steel out of the market.

-Edwin C. Barringer, Executive Vice President Institute of Scrap Iron and Steel





LONG SHOULDER TYPE -Small toe closes. Use to heap guide pin in bushing during strains. Long wearing breasts plained on hardward stant. ** 10.7" of the



WEAVY DUTY—Large toe clamp, for large and beavy die sets requiring extra body and shoulder Dickness. Broaze plated 2" to 3" pin diameter.



HUT TYPE—For wide range of requirements. Available in 5 sizes, 1° to 2° pin diameter, long-wearing bronze plated on

GUIDE PINS and GUIDE PIN BUSHINGS

Because high production, quality control and longer die life have become all-important, most stamping plants have now standardized on Lamina guide pins and Lamina bronze-plated bushings.

All Lamina wring-fit bushings are pre-finished on the L.D. Seated on a ground shoulder square with the surface of the die shoe and secured by special retainers, they assure distortion-free, full bearing surface that results in better die alignment, less maintenance and longer die life. Lamina guide pins are special tool steel, heat treated, spray quenched, ground and burnished. The uniform, hard surface resists wear and the tough core prevents bending during installation or use. The pins are dimensionally accurate, do not "mushroom" or get out of round, and require no "running in".

There is a type and size Lamina Guide Pin and Bushing for every need. Our new catalog gives illustrations, applications, dimensions and prices of more than 800 items. Write for free copy.





LONG SHOULDER TYPE—Large clamp Long bearing surface contains pin durin entire stroke. 2° to 3° pin diameter



SHORT SHOULDER TYPE—For die spece mare beoring arts willin die ares. Brosso on steel er selld Ampco Bronze. 7 lengtho pin sizes 'K" to 2".



RING CLAMP TYPE—for heavy duty and become die selt. Branza-plated cheel or Ampco Bronze, 4 lengths, pin dismoler 2½° to 4½°.

shipments will be 8 percent higher than those of the comparable period in 1956. Total 1956 shipments are expected to approximate 4.23 billion pounds, or 6 percent more than those of 1955, the previous record year.

The aluminum supply situation in the first six months of 1957 is expected to be more than adequate, and a substantially greater capacity is in prospect for later periods as the result of new major expansion programs being carried out by the industry.

MACHINE TOOLS: Shipments of cutting type machine tools in the period January-June 1957 are estimated at \$410 million, as compared to an estimated \$394.3 million in the comparable period in 1956. New orders for cutting types are expected to approximate \$440 million, as against the estimate of \$505 million for the first half of 1956.

Shipments of forming and shap-

ing machine tools in the first half of 1957 are expected to approximate \$145 million, an increase of \$2 million over comparable shipments in the first half of 1956. New orders for forming and shaping types of machine tools in the first six months of 1957 are estimated at \$105 million, as against \$131 million for the comparable period of 1956.

AUTOMOBILES, TRUCKS, ETC.: Production of 3,400,000 automobiles is anticipated for the first six months of 1957. This estimate is based on a total of 6,500,000 production for the year, with the first half producing 52 percent. By comparison, it is estimated that 1956 production will have approximated 5,850,000 automobiles.

Motor truck production for the first six months of 1957 is expected to be 3 percent below that of the corresponding period in 1956. Average monthly production is estimated to approximate 95,000 units.

The problem of heavy industry, where large amounts of money are required for equipment, lies in the need for a revision of depreciation allowances under the tax laws. Need for such revision again is rooted in growing inflation. Under the present law business is allowed depreciation for only the number of dollars originally invested in a given facility regardless of the decline in the dollar's buying power. When it becomes necessary to replace such a facility, we find that inflation has increased equipment costs several times over the cost of years ago.

—Roger M. Blough, Chairman of the Board United States Steel Corp.



THIS IS RIDICULOUS...

No one's seen a die set as shiny-bright as this one. It's always buried away in a punch press, dirty and oily, banging out piece after piece, day after day.

And each one of those pieces is just alike within thousandths of an inch. That's production precision.

And it's why you use a die set — to maintain that precision.

Detroit die sets meet all the precision requirements of a die set, in parallelism, squareness and finish. Ask for your copy of our new catalog today.

OFFICES IN PRINCIPAL INDUSTRIAL CENTERS



2895 WEST GRAND BOULEVARD . DETROIT 2, MICH.

Use postpaid card. Circle No. 294



Send for our new brochure describing the 16 points of superiority of the VEET Precision Radial Drill.



Use postpaid card. Circle No. 295

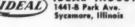
MEETINGS CONVENTIONS EXHIBITIONS

- Mar. 5-7—Society of Automotive Engineers, Inc. National Passenger Car, Body and Materials Meeting, The Sheraton-Cadillac, Detroit, Mich.
- Mar. 6-8 Pressed Metal Institute Annual Spring Technical Meeting, Hotel Carter, Cleveland, Ohio. Institute headquarters: 3673 Lee Road, Cleveland 20, Ohio.
- Mar. 12-14—Electrical Industrial Exposition, Olympic Park Auditorium, Newark, N.J.
- Mar. 17-21—American Society of Mechanical Engineers, Gas Turbine Power Division, Detroit, Mich.
- Mar. 18-21—Society of the Plastics Industry
 Annual National Conference and Pacific
 Coast Plastics Exposition, Los Angeles, Calif.
 Locale to be announced.
- Mar. 20-22—Society of Automotive Engineers, Inc. National Production Meeting and Forum, Hotel Statler, Buffalo, N.Y.
- Mar. 23-28—American Society of Tool Engineers Convention and Annual Meeting, Houston, Texas. All requests for hotel reservations should be sent directly to the hotel.
- Mar. 25-29—Western Metal Congress & Exposition sponsored by The American Society for Metals, Pan-Pacific Auditorium, Los Angeles, Calif. Association headquarters: 7301 Euclid Ave., Cleveland, Ohio.
- Apr. 3-5—American Institute of Electrical Engineers Southern District (No. 4) Meeting, Jackson, Miss.

Apr. 8-12—American Welding Society Spring Technical, National, and Welding Show, Hotel Sheraton, Philadelphia, Pa. Society headquarters: 33 W. 39th St., New York 18, N.Y.

Apr. 30-May 1 — Metal Powder Association 1957 Metal Powder Show, Drake Hotel, Chicago, Ill. Association headquarters: 130 W. 42nd St., New York 36, N.Y. May 1-3—1957 Electronic Components Symposium, sponsored by American Institute of Electrical Engineers, Institute of Radio Engineers, Radio-Electronics-Television Manufacturers Assn. and West Coast Electronic Manufacturers Assn. Morrison Hotel, Chicago, Ill. Symposium headquarters: J. S. Powers, Electronic Components Symposium, 84 E. Randolph St., Chicago 1, Ill.





Write for
Complete catalog data
and specifications.

Use postpaid card. Circle No. 296

IDEAL INDUSTRIES, Inc.

NEW. for faster assembly THOR UNI-TORK

Air and Electric Screwdrivers and Nutsetters

For Uniform Torque control of

threaded fasteners

Thor Uni-Tork Tools deliver uniform

torque output. When desired torque is reached. Uni-Tork snaps out of engagement. No more ratcheting, no slipping, no buzzing of clutch jaws. Thor Uni-Tork's external torque ad-

justment, from 10 to 100 inch-pounds. permits faster set-up on any assembly job, holds torque setting indefinitely. saves wear and tear on tools.

All Thor Uni-Tork Air Tools are equipped with Thor Silentair Mufflers. reducing exhaust whine to a whisper. For a demonstration, call your nearest Thor factory branch. Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.



You can have the benefit of Uni-Tork on your present Thor Screwdrivers and Nutsetters. Ask for full details.

THOR POWER TOOL COMPANY

Chicago, Illinois Branches in all principal cities

Use postpaid card. Circle No. 297

MACHINE and TOOL BLUE BOOK

LETTERS TO THE EDITOR

MACHINE AND TOOL

blue book

Your discussion about Graphite Grinding Wheels, which was discussed at the Edgewater Beach Hotel in Chicago, during the Machine Tool Builders' meeting in November was very interesting.

I have searched through the last few editions of the Blue Book, but cannot find any information pertaining to these graphite wheels or their applications.

It would be greatly appreciated if you would send me this information or advise me as to the source of supply.

R. H. Fairbanks Chief Tool Designer The Heald Machine Company Worcester, Mass.

Thanks for your kind words! I certainly enjoyed speaking at the Machine Tool Builders' meeting. We will be having something on graphite wheels in forthcoming issues of BLUE BOOK.

-W. F. S.

"What Makes Employees Quit?"

Over a period of many years my time has been equally divided between staff and line. This should qualify me to answer the question: "What makes employees quit?" It is true they give the excuse of more money, better job, family moving, and many others. They give these reasons because they find something lacking. They are not satisfied but they can not put their finger on the real reason. The reason is "They can't find expression within the company area."

What a lot of ground these words cover. Working under the spirit of approval. They want a share in the discovery of facts. Other things they want to know is the why, where, when and how. Top brass all the way down to the fellow who sweeps the floor want receptive attitudes, blending of thoughts, and frank discussions. Em-

ployees want to feel they are important to the job. They want to be appreciated for some particular ability. Regardless of the job strata we all want an exchange of ideas and viewpoints. They like to work for a shop that will allow them to criticize or suggest without fear of reprisal. Employees want to be informed not just a cold blueprint or a number. This has nothing to do with molly coddling the employees. The rules must be lived up to. Praise some particular ability when you reprimand the employee. Take the sting out of the reprimand. Human relationships are still the biggest single fact in industry. It is people working together for a common good. The good leader is like the coach on a football team. He knows how to arouse desire and enthusiasm. He is a good leader who knows how to get teamwork. The enforcer can threaten a man with the loss of his job. He can run roughshod over the emcontinued

ployee's feelings to get the job done. He can not however make the employee like him or the job with such methods. The leader treats employees by a friendly approach. He finds opportunities to serve and have others serve him. The profits of a successful organization support us all. It is this kind of accomplishment that leads to mutual advancement.

A. E. Salmons
Dixon Valve & Coupling
Company
Philadelphia, Pa.

Reply to Mr. Shaw On the Classics

This is in reference to the letter from Mr. Shaw, reproduced on page 91 of your December issue.

While Mr. Shaw does not care about "the Classics"; and while I am sure Mr. Shaw is not the only engineer who feels that way; and while I am further not in the possession of any statistics which can be cited to the effect that so-and-so many engineers do care about knowledge which is not directly usable to decipher "dissertations in atomic theory," as compared to so-and-so many who don't; here is at least one engineer who feels that his life would be poor indeed if it contained nothing but "engineering" in its most narrow definition-and I am certain that I am not alone in this, in fact I don't even think that I belong to a minority among engineers.

Let's first set a few things straight. Webster defines Classics as follows: A work of highest class and of acknowledged excellence . . . originally, and still especially used of Greek and Latin words . . . but now also applied to works of a like character in any language, and extended to art. The definition of Humanities reads: The branches of polite learning regarded as primarily conducive to culture.

So, of course "the Classics do not include the Humanities"; but the humanities do include the classics.

Next, Mr. Shaw could hardly have chosen a less fitting example of his "scientist who likes science and nothing else" than Mr. Einstein who wrote "About Zionism," "Why War?", "My Philosophy", "The World as I See It" and other works which testify to his learning outside the field of natural science.

Now, I had more years of Latin than Mr. Shaw; but nobody had to "ram it down my throat." And I have studied quite a few other things which have no direct relationship to my ability to determine beam stresses. And I must say, I am glad I did study them.

However, I do agree that we have need for a group of technical personnel—I would hate to have them called "Engineers"—whose primary and perhaps exclusive interest may lie between steam tables and differential equations; and I am rather surprised that such people cannot enter an accredited college without having mastered "... Latin, Classical French or German, etc. . . ." For I myself went to one (The Cooper Union School of Engineering, New York City) where a foreign language was required neither for admission nor for graduation. . . .

W. H. OETTINGER
SENIOR PRODUCT ENGINEER
INTERNATIONAL GENERAL
ELECTRIC COMPANY
NEW YORK, N. Y.

to do small grinding jobs to MICRO-PRECISION FAST...

you need the SANFORD Model SG SURFACE GRINDER

This unrivalled small parts grinder can be depended upon for micro accuracy. It's easy to use too . . . every hand wheel and operating switch is at your finger tips.

Designed and built by engineers and tool makers of rare foresight for tool, die and gage work, it has been constantly preferred after these many years of proven worth.

Write for fully illustrated literature, replacement parts and special attachments data with price list.



For WET or DRY grinding, specify optional equipment.

PARTIAL SPECIFICATIONS -

Chuck Surface—3"x5" or 4"x6".

Table travel—8", traverse 4".

Vertical head movement—6".

Work area under 4" wheel—6",

with chuck—4".

Standard grinding wheel—

4" x 3/8" x 1/2".

Spindle speed—approx. 5500 RPM,

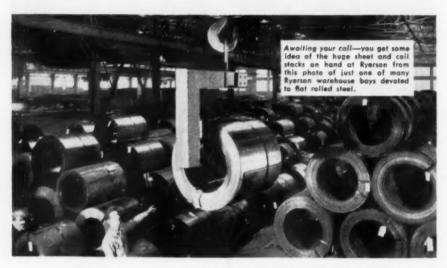
Motor, 1/6 HP, single or 3 ph.,
dynamically balanced.

Dimensions — 23" x 30" x 27" high, Net wt. approx. 160 lbs.

Representatives in major industrial areas

SANFORD MANUFACTURING CORP.
1026 Commerce Ave., Union, N. J.

Use postpaid card. Circle No. 298



On sheet and strip requirements...

are YOU getting this 3-point service?

Sheet and strip buyers tell us that three kinds of purchasing help keep them coming back to Ryerson:

1. WIDER SELECTION OF TYPES— More than 20 kinds of sheet and coil stock are on hand in an unusually wide range of gauges making it easier to get the exact steel needed for any requirement.

2. GREATER PROCESSING CAPACITY
— The most extensive cutting and processing facilities in the steel-service industry enable buyers to get quickest service on requirements for special sizes, strip and sketch cutting, blanks, slit coils, edging, or any other processing.

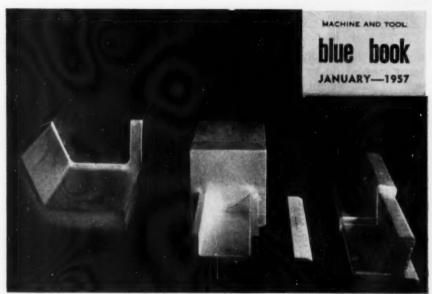
3. HELP ON SHEET AND STRIP PROBLEMS—The large Ryerson staff of sheet and strip specialists gives buyers a valuable source of help in selecting the most satisfactory and economical stock—or in solving any other problem of application and fabrication.

In addition, sheet and strip buyers like the good packaging, the dependable weight and on-schedule delivery that they get from Ryerson—and the convenience of one-order buying of all steel products from the same source. So call your nearby Ryerson plant for 3-way help on sheet and strip needs.

RYERSON STEEL

In stock: Bars, structurals, plates, sheets & strip, tubing, alloys, stainless, reinforcing, machinery & tools, etc.

BOSEPH T, EYERSON & SON, INC. PLANTS AT: NEW YORK + BOSTON + WALLINGFORD, CCNNL + PHILADELPHIA + CHARLOTTE, N. C. + CINCINNATI CLEVELAND + DETROIT + PITTSBURGH + BUFFALO + CHICAGO + MILWAUKEE + ST. LOUIS + LOS ANGELES + SAN FRANCISCO + SPOKANE + SEATILE



1. TYPICAL STEPPED EXIMUSIONS.

New demands bring new applications for

Stepped Aluminum Extrusions

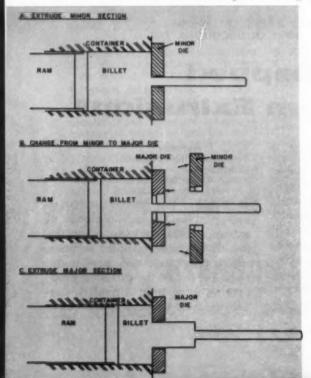
Because stepped extrusions have proven economical for certain aircraft structural parts, new and more difficult tasks are being demanded of this tool. When you combine two parts into one, you save on machining time, basic materials and assembly costs.

By C. J. Huffman Technical Superintendent Halethorpe Works Kaiser Aluminum & Chemical Corp.

• Industry has played an important part in the advancement of extrusion technology through its demands for more complex sections, closer tolerances, and new materials. Typical of the extruded products resulting from Aircraft Industry demands is the stepped extrusion, Fig. 1. Initially these efforts were spurred on to overcome the volume and weight limitations of existing equipment. Placing material where it is required along the extruded length makes it possible to design integral connecting lugs and obtain the longer lengths required.

A variety of methods have been devised to produce extrusions with variable cross sections throughout the length.

Early patent literature describes the use of tapered or stepped mandrels used to produce tapered hollow extrusions which were split longitudinally to produce relatively simple sections. Extrusion dies with externally operated movable segments have been described in great detail to produce tapered and stepped parts. These were the forerunners of the step extrusion processes which are in common usage today. Step extrusions are commonly produced at the present time utilizing two sets of extrusion dies. The small or minor section is extruded first to the desired length at which point the extrusion cycle is interrupted long enough to change dies to produce the major configuration. (See Fig. 2 and 3.)



2. STEP EXTRUSION PROCESS. Dies in most cases are comprised of two segments to facilitate removal of dies from extruded part. Left: schematic tooling arrangement and operational sequence for this method of producing stepped extrusions.

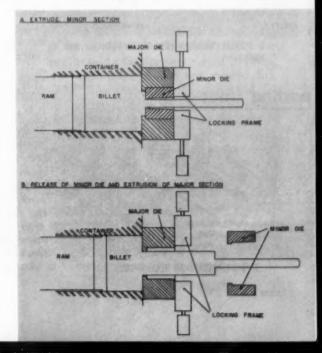
In working from the finished machined part to the stepped extrusion requirements, dimensional tolerances are of prime importance to insure ability to manufacture the desired part yet avoid an excess of stock. Stepped extrusion tolerances have not been standardized throughout the industry at present, however the following are typical of those that can be obtained today. These differ primarily from normal extrusion tolerances in straightness and step area dimensions. The straightness of the overall part is measured by deviation from a reference line with the junction area (8" on either side of the step) being excluded, Fig. 4.

The straightness of minor and major positions of the extrusion is determined individually with the junction area being excluded. The minor and major positions are usually furnished to standard extrusion straightness tolerances.

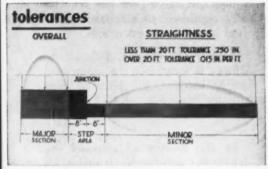
Due to the change of flow conditions in extruding the major and minor sections, the junction area usually presents the greatest straightening problems. (Fig. 5.)

In the design of stepped extrusions, produced from split dies, parting line locations should be considered not only from the tolerance standpoint, but from the ability to remove tools from the section.

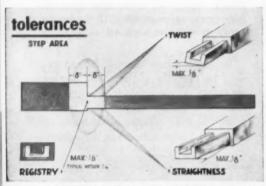
In some cases it may be necessary to provide slight draft angles on extended elements to accomplish this. While the major and minor sections may frequently have a common plane, this is not a require-



3. USING A SECONDARY LOCKING FRAME, a modification of Fig. 2. With single piece dies, the minor must be stripped off the end of extruded section with the major die being threaded over the end of the minor part.



4. OVERALL DIMENSIONAL TOLERANCES.



5. TYPICAL JUNCTION AREA TOLERANCES and their application.

B DIMENSIONS STANDARD TOLEBANCE + 127 PROJES

6. CROSS SECTIONAL TOLERANCES.

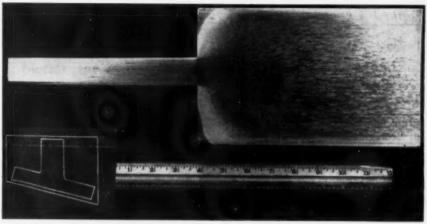
ment of the process. In all cases the major section must completely enclose the minor.

Cross sectional tolerances of stepped extrusions are usually greater than normal due to the inherent instability of split dies. It is generally necessary to provide sufficient machining stock on all surfaces of the section to be able to obtain the required accuracy of dimension and surface finish requirements. This is particularly true regarding dimensions which fall across the parting lines of the die. An additional tolerance is usually required on these dimensions due to the possible shifting of the die segments, Fig. 6.

With the abrupt change in flow pattern between the minor and major sections, areas of reduced mechanical properties are sometimes encountered at the junction extremities of the major section. This condition is illustrated by the flow pattern shown in Fig. 7. Here the so-called dead metal area not included in the direct flow path would be removed by following recommended machining practices shown in Fig. 8.

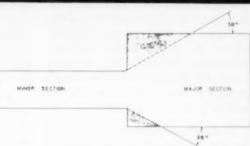
The cross-sectional areas of major and minor sections and the ratio of major area to minor area will have a marked influence on the mechanical properties obtainable.

In normal aluminum extrusions,



7. FLOW PATTERN shewing dead metal areas at junction extremities of the major section.

8. RECOMMENDED MACHINING PRACTICE for removing dead metal areas.



mechanical properties are dependent on the degree of working the cast ingot received as measured by the reduction ratio. The reduction ratio is the ratio of extrusion press container area to the area of the part being extruded. Sub-standard mechanical properties are obtained in 7075 aluminum alloy when reduction ratios less than about 6:1 are used. When reduction ratios greater than about 30:1 are used for 7075 alloy, excessive pressures are required.

The designer usually has no knowledge or control of the container size on which a part is to be produced. In order to make the section producible under optimum conditions, the major area to minor area ratio should not exceed 5:1.

The mechanical properties of stepped extrusions, particularly the junction area, have been the subject of many discussions. In some cases, due to the differences in areas and thicknesses it will be necessary to work to two sets of allowable design stresses in the major and minor parts of the extrusion. As the producer cannot vary extrusion temperatures rapidly enough to create ideal conditions for both major and minor sections, it is necessary to

A 2% permanent set stretch of extrusions should eliminate warpage occurring after machining

use a compromise for the extrusion of both parts. For example, it may be necessary to use an elevated extrusion temperature to start the minor section moving through the die. After the dies are changed to produce the major section this temperature may be considerably in excess of that required. From the standpoint of pressure requirements the major section has the advantage of a lower reduction ratio and the reduced billet length resulting from extrusion of the minor part.

In most cases the strength levels in the minor section are slightly greater than in the major, with the junction properties being equal to or slightly lower than in the major section.

Finishing operations for step extrusions follow, in general, the practices used for normal products. A typical sequence of operations for 7075 aluminum alloy step extrusions would be as follows:

- (a) Extrude
- (b) Solution heat treat
- (c) Stretch straighten
- (d) Cut to length
- (e) Age

In the solution heat treating operations, time at temperature would be determined by the thickest element of the major section which would probably be slightly longer than the time required for the minor section alone. The normal practice in stretching is to grip each end of the section in a hydraulic unit and exert the necessary stretching force to straighten the part. Due to the differences in area, all of the permanent set in stretching is obtained in the minor section. It may be necessary in some cases to carry out straightening operations on the major section and step area on a gag press. These operations would be performed before solution heat treatment wherever possible to avoid leaving residual stresses.

As all step extrusions are machined to varying degrees the problems of warpage following machining are frequently encountered.

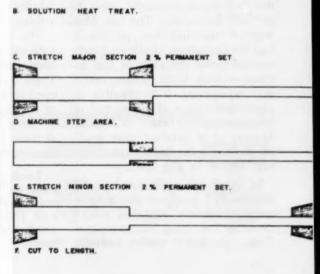
This is very likely aggravated by differential residual stress patterns in the minor and major sections of the extrusion. Experience on plate has indicated that a 2% permanent set stretch will virtually eliminate warpage which occurs following machining operations. Experience on extrusions indicates similar results may be achieved by stretching. The optimum amount of stretching required on extrusions has not been clearly established. A possible approach to this problem would be the addition of finishing operations in the sequence shown in Fig. 9.

In considering other new developments in the step extrusion field it has long been considered a possibility to produce parts with two, three or more steps. In these cases, rather than two sets of dies, three or more sets would be used to produce the desired configurations.

Extrusion technology has ad-

vanced very rapidly in the past several years, making it difficult to predict lines of future growth. The present day producer many times finds himself producing products which a few years ago may have been considered impossible or impractical. A possible step extrusion which might be produced in the future would be an extrusion with a major section on both ends. such as shown in Fig. 10A. This would allow an integral fitting to be used on both extremities of the part. With the advancement of extrusion technology, this appears possible and may become commonplace in the future. Many of the present step extrusions are used for aircraft spar cap applications.

9. POSSIBLE APPROACH to problem of optimum amount of stretching required on extrusions is addition of finishing operations in this sequence. The additional stretching and machining operations would result in a part uniformly stretched throughout the length. Work on this process is still in the development stage. It is not yet possible to predict whether this method will successfully reduce warpage or whether the improvement will be sufficient to justify the additional costs.



A EXTRUDE.

Looking ahead: 3 or more step extrusions

Requirements for step extrusions can be visualized with the major portion being located in the center of the part as shown in Fig. 10B. It would seem that extrusions of this type could be ideally used for aircraft stabilizer spar caps extending completely through the fuselage or for similar applications on the wing. In some cases this enlarged portion could be used for attachment points for the landing gear.

Many applications for large tubular parts are being developed in the missile field. Internal and external steps on these tubes can be obtained through the use of a stepped mandrel combined with the techniques normally used to produce extrusions. The use of a stepped mandrel has previously had the limitations of allowing only unidirectional stepping of the interior surface. With modern extrusion equipment it is possible to place these steps at either end of the tube or in the center, as desired. Typical of a product that could be produced by this means is the part shown in Fig. 10C.

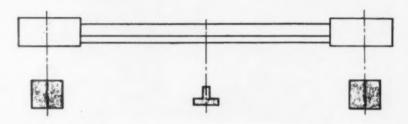
In other areas of development of extruded products for aircraft usage, integrally stiffened panels are now becoming commonplace. These products are presently available in widths up to 25" extruded in a flat configuration. Development work indicates greater widths are available from existing equipment. Frequently this type of section will be extruded in a "V" or tubular configuration to obtain greater widths. A great deal of effort has been expended in attempting to flatten tubular extrusions to obtain the desired flatness required of aerodynamic surfaces. The success of this work has been limited, hence, the uses of this product have been principally in interior applications. With the amount of development effort being expended in this area, it seems very likely the problem of flattening tubular extrusions will soon become a thing of the past.

The extrusion of tubular parts with external or internal rifling has been carried on for some time. These techniques have been developed to a point where it is possible to maintain very close tolerances on the degree of spiral. Parts such as these have found application in the missile field.

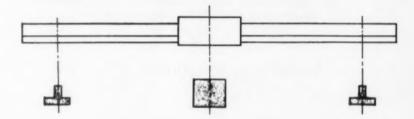
Looking to the future on the uses of extrusions in the Aircraft Industry, it seems that a new family of products will be produced within the next few years.

may become practical and commonplace

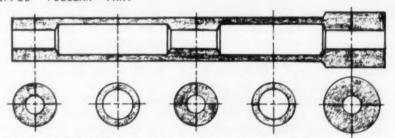
A. STEP ON BOTH ENDS



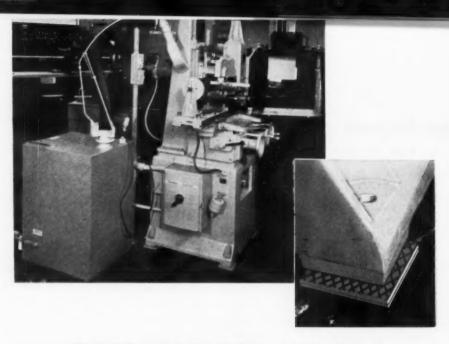
B. STEP IN CENTER



C. STEPPED TUBULAR PART



10. TIME AND DEVELOPMENT EFFORT could make these extrusions a production reality.



THIS CLEVELAND VISUAL GRINDER is installed on 4 "Air-Loc" mounts, each cut square with a saw. Close-up of base shows empty bolt holes.

Installing Machines on "AIR"

• One of the big requirements in planning the shop layout of the tool room in Western Electric's new Winston-Salem plant was flexibility which would permit almost instant moving of any machine at any time in the future. Thus, many machines are installed without bolting, cementing or otherwise attaching them to the floor. The feet or bases of machines are set on patented mounts made of Vinyl Chloride surrounded by long sisal fibres and resilient cork. The combination of vinyl, sisal and cork reduces trans-

mitted noise and vibration as much as 85%.

As shown in the illustration, the mounts used at Western Electric contain cross-hatched serrations .060" deep. The serrations are on both sides of the mounts and provide adequate bonding to machine feet and floor. Completely resistant to oil, water, alkali and weak acids, the "Air-Loc" mounts can be reused when machines are moved to new locations. Thus, first cost for the mounts is the only cost.



Quality: Quality

Threads can be no better than the taps you use. That's why it's important to use taps that are as near perfection as it is possible to make them.

''Greenfield's'' close control of every measurable element of a tap is your guarantee that you $\underline{\text{are}}$ buying the best that can be made.

This accuracy is bound to be reflected in the threads they tap.

GREENFIELD TAP AND DIE CORPORATION, GREENFIELD, MASS.

Making the best...BETTER

- . Ease of assembly and disassembly.
- Improved driving construction for freer and smoother operation.
- Improved locking bolt and segment providing greater wear life.
- Tongue and groove drive between cam spring plate and skeleton.
- More rugged construction of small parts
 — new and heavier stop plunger, larger adjusting screws (Hollow Hex), heavier tripping mechanism, larger cam spring plate screws without increase in size or weight of die head.
- Flatted construction of backpart and shank (permitting the die head to be installed as close to the turret as possible without interference).
- 7. Better interchangeability of parts.
- 8. Present DS chasers interchange in New "DSA" Model.

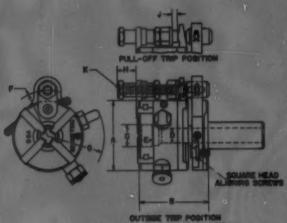
NEW Geometric Convertible self-opening die head with aligning shank



There is no better Die Head available for use on Brown and Sharpe and other small screw machines of either the automatic or hand type than the NEW Geometric convertible self-opening style DSA Die Head.

The NEW DSA comes with an aligning shank which permits adjustment for machine misalignment. It is equipped, also, with both Outside Trip for short length, fine pitch shoulder threading and a Pull-Off Trip for threading lengths providing ample chaser engagement for tripping. Conversion from one trip to the other is quick and simple. The DSA is especially recommended for cutting fine pitch threads of short lengths.

An outstanding Die Head that is really rugged, requires minimum attention and is easier to adjust, the DSA now joins the Geometric family of the best in precision threading tools.



GEOMETRIC TOOL COMPANY DIVISION

GREENPIELD TAP AND BIE CORPORATION
NEW HAVEN 15, CONNECTICUT

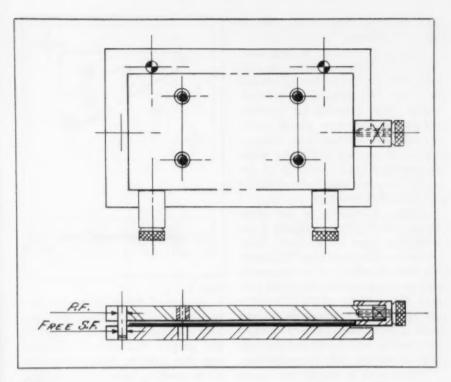


Figure 1.

Plate type jigs for . . .

Low Cost Drilling

By Allan Young
Tool Design Engineer
Collins Radio Company

• The most simple and inexpensive type of drill jig which can be used on a variety of parts is the plate or sandwich type jig. This consists of simply positioning the part between two plates, one of which is the drill plate, containing the bushings or drill guide holes,

the locators, and the clamps, if any are required, and a backup plate, which has clearance holes for the drills and is aligned with the drill plate by two pins.

Figure 1 is the most common of plate type jigs. In this case the part is a flat sheared plate which is pushed against three locator pins by three clamps. The locator pins

also serve as alignment pins for

the two plates.

Figure 2 consists of the same type of assembly, except in this case the part has been blanked in a die and two holes have already been pierced for locating purposes. The two plates again are aligned by two pins, one of which is smaller than the other to assure proper assembly of the jig so the clearance holes will line up with the bushings.

Figure 3 consists of the same basic construction as figure 2 except this part must have holes drilled in the edges also. The bushing plate is milled out on the under side to accommodate the piece part and the bottom plate. The two plates are held together during the drilling operation by two quarter turn screws which slip out through slots in the top plate for unloading.

Figure 4 is a simple one piece jig for drilling holes in the bottom of a round can or shell, or other round part. The cavity in the jig

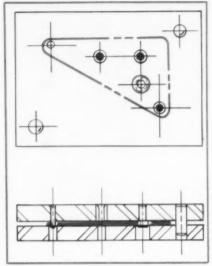
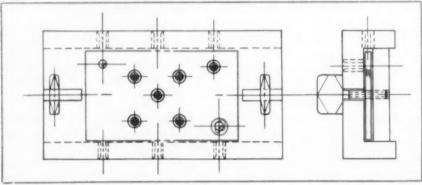


Figure 2.

is machined to fit over the part for location, and after the first hole is drilled, a drill or pin of the proper diameter is dropped into the hole to hold orientation of succeeding holes to be drilled.

Figure 5 is a jig for drilling holes in the sides of a round part such as rods or tubing. The part is

Figure 3.



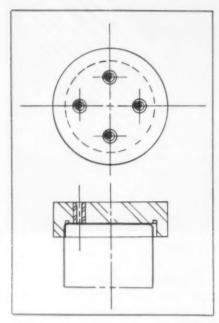
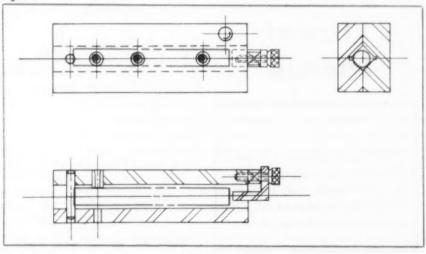


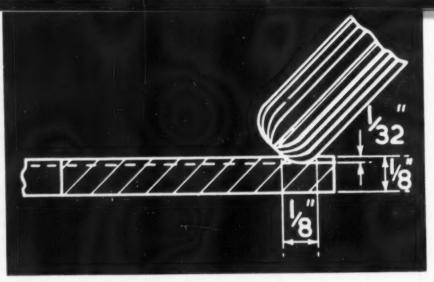
Figure 4.

held between two v-blocks which are aligned by pins, and pushed up against an end stop pin by a simple clamp. After the first hole is drilled, a drill or pin can be placed in it to hold location for the rest of the holes to be drilled.

It should be remembered that all clamping and locating in platetype jigs should be done in the drill plate, so there is no close relationship to be held between plates. There are many cases also where it is necessary to use a hardened and ground drill plate because of the difficulty or impossibility of getting bushings in the plate, due to nearness of holes to each other or to locators. Also for short run jobs with wide tolerances it might be feasible to just use a mild steel plate with no bushings. Just ream holes to drill size in the plate and use them as guide holes.

Figure 5.





1. SHAPE OF CUTTER for milling semi-circular shaped oil grooves.

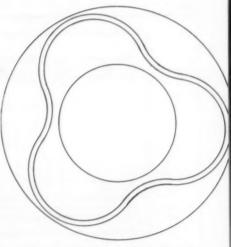
Designing a Fixture for

Milling Oil Grooves in

Bronze Thrust Plates

By C. T. Bower, A. M. I., Prod. E.

While great accuracy is not required, the fixture had to be economical, easy to construct and capable of taking other sizes of thrust plates.



2. THRUST PLATE has 4-inch outside diameter.

• Quantities of bronze thrust plates having a continuous sixlobed oil groove milled in one face are required in the printing machine manufacturing industry. The thrust plate is illustrated in Fig. 2 and is 4-in. outside diameter. For the same machines, other sizes of thrust plate are used and all have oil grooves similar in shape to that shown. The oil groove in all cases is almost semi-circular in section, as shown in the enlarged view (Fig. 1).

One of the requirements of the design for milling the oil grooves was that the fixture should be economical and easy to construct. A further requirement was that the fixture should be capable of taking various other sizes of thrust plates.

A vertical milling machine was chosen for cutting the grooves; as this was provided with a swivelling head, the cutter shape shown in Fig. 1 was adopted.

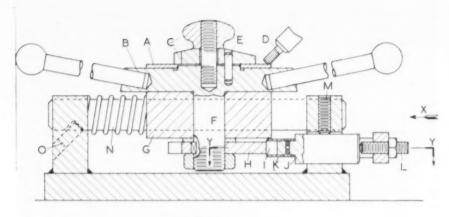
Placing the milling cutter center line at an angle to the plane of the work offers certain production advantages. The first advantage is that a large diameter end mill can be used and as the larger end mill is stronger, the danger of cutter breakage is reduced considerably. Other advantages of the large diameter end mill include easier sharpening, increased peripheral speed and more efficient cutter action since the dead spot at the cutter axis is not in contact with the work.

Fig. 3 illustrates the fixture designed for milling the oil grooves. It is hand-operated and the track of the oil groove is governed by means of a cam. Hand-operation was chosen for the fixture as being the most economical way of supplying low power. The cutting force required to produce the oil groove is not heavy, the major force required from the hands of the operator being absorbed by overcoming the pressure of the springs with which the cam is loaded.

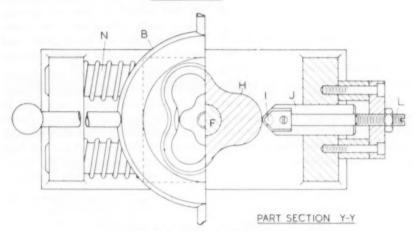
Great accuracy is not required in the shape of the oil groove track and, therefore, the cams were laid out on steel plate and are bandsawn and filed to shape.

Splitting the scribed line during final band filing produces a cam shape of sufficient accuracy to meet the specification laid down. The cam can be interchanged with others of different shape so that a wide range of oil groove tracks can be produced in the fixture.

Section Z-Z is taken through the length of the fixture. The component A is supported on the top surface of the work-table B and is clamped to it by means of the cutout block C. This block is substantially circular in shape but is machined on its periphery so as not to impede the milling cutter D as it travels towards the work-table center. The clamping block is pressed into contact with the upper surface of the component by means of a standard screwed knob engag-



SECTION Z-Z

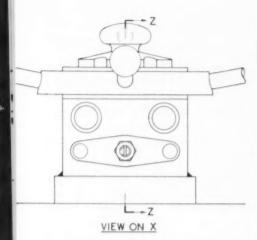


3. FIXTURE DESIGNED for milling oil grooves.

Milling Oil Grooves

continued

ing with a stud placed centrally in the work-table. The bore of the component locates upon a shallow flange projecting from the surface of the work-table and it is not imperative that it be loaded in place in any special way. However, it is important that the clamp block should always be placed in position correctly each time. To ensure this,



a dowel hole drilled in the clamp block engages with a pin E driven into the work-table.

Projecting below the work-table and integral therewith is the spindle F which is a close-running fit in its vertical hole machined through the horizontally sliding carriage G. Keyed to the lower end of the spindle is the cam H upon the edge of which bears the roller follower I.

In order that the roller follower diameter be kept to the minimum, it is mounted in a partially cylindrical hole drilled across the end face of the support J. It is retained in place endwise by means of the thin steel plates K which are held in position by means of countersunk head screws. This method of mounting a small roller allows it to be of small diameter while the supporting means can be very sturdy. It will be noted from Section Z-Z that the roller support is

of cylindrical section. This results in a lower manufacturing cost. It is mounted in a hole bored through the right hand end plate of the fixture.

The roller follower for the cam remains stationary while the cam rides over it as it is rotated and thus carries the sliding carriage back and forth, together with the component.

To accommodate different cams, the roller follower can be adjusted towards or away from the cam axis by sliding the support J in its mounting hole. The support is positively located axially by means of the adjusting screw L which can be locked in position by means of a half-nut. To prevent the support from rotating in its mounting hole, a flat is milled along the upper surface and this is engaged by the point of the locking screw M which also secures the roller follower.

Sliding carriage G consists simply of a square block of mild steel through which are bored a pair of horizontal and parallel holes to take the cylindrical slide bars N. The bars are hardened and ground and are a close sliding fit within the holes bored in the sliding carriage. The bars are supported at their ends in close fitting holes bored through the end plates of the fixture body and are locked therein by means of the angularly placed screws O. The locking screws are placed in this manner so as to exert vertical pressure upon the slide bars, while holding them positively endwise. The screws press upward because there is insufficient metal to accommodate them in the upper part of the fixture end plates.

Cylindrical slides, while low costing, are very accurate. It is essential, however, that an accurate machine, such as a jig borer, be available for boring both the mounting holes for the bars and the sliding holes in the carriage. The locking screws for the bars must be arranged as explained above so that their pressure does not tend to alter the center distance between the bars, thus tightening the slide.

The cylindrical slide bars offer an ideal mounting for the compression springs placed thereon for the purpose of pressing the sliding carriage in a right-hand direction. Since the cam is mounted upon the vertical spindle placed in the carriage, the springs always hold the cam edge in contact with the stationary roller follower.

To load and unload components, the machine-table, to which the fixture is bolted, is lowered away from the cutter.

This is the simplest way of getting the cutter clear of the work. When a new component is loaded the table is raised to engage the cutter with the work. The cutter, suitably guarded, is kept running

the whole time the machine is operating since the spindle speed is 2,500 r.p.m. and starting and stopping frequently at this high speed is not very good for either the spindle bearings or the drying motor.

When the cutter has been sunk into the new component to the required depth, the operator grasps any one of the four ball-ended levers projecting from the edge of the work-table and proceeds to rotate the work against the cutter. The cam rides over the follower and the work reciprocates while rotating and the desired oil groove path is produced.

A cemented carbide cutter is used and mills many thousands of grooves between grinds. Although a H.S. steel cutter could be used effectively, it is considered to be better policy to use the carbide cutter for form milling as the shape will be retained longer and grinding is more economical in the long run.

REPRINTS AVAILABLE

- What is the Smallest Radius that Can be Dressed with a Wheel Dresser? by Henry F. Swenson.
- Where and How Can You Use Abrasive Rolls? by Robert Mc-Adams and James L. Erickson.
- 3. Flexible Re-inforced Wheels by Richard C. Bush.

HAMILTON

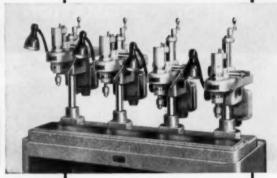
SUPER SENSITIVE, SMALL-HOLE

PRECISION

REPEAT

PRECISION

DRILLING MACHINES



for the finest work you do

SINGLE OR MULTIPLE SPINDLES • VARIOUS CAPACITIES • WIDE RANGE OF CLEARANCES • VARIABLE SPINDLE SPEEDS • COMPANION TAPPING MACHINES



Designed and built to master the heart-breaking jobs which are so often attempted on drilling machines of "standard" accuracy.

YOU

will want full information! WE WILL SUPPLY IT

FREE

ask for BULLETIN No. 2467

ADDRESS

THE HAMILTON TOOL COMPANY 826 South Ninth Street HAMILTON, OHIO



2467

NEWS OF AUTOMATION

blue book

Numerical Control System

... makes standard machine tools fully automatic

By L. S. Peck

Application Engineer, Autonetics Division, North American Aviation, Inc.

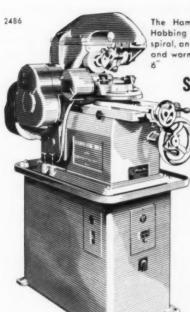
• The advantages of automatic machining, heretofore limited to high-volume production operations, have been extended to small-lot and single-part production of aircraft tools and parts at North American Aviation, Inc., with the installation of Numill—a tape-



A SIMPLE PRESS of the control pendant button starts a template milling operation automatically controlled by the Numill tape control system. Controls consist of a display panel, control pendant, measuring gages, and a tape-reader console.

control system for standard machine tools.

The present Numill controls are ap-



The Hamilton No. 1-B Precision, Small-Gear Hobbing Machine. Generates precision spur, spiral, and bevel gears, face gears, worm gears, and worms. Maximum diameter of work piece,

SMALL PRECISION

Gears without toars

HERE'S WHY

The Hamilton Precision, Small-Gear Hobbing Machine, the hobber with a "reserve of accuracy," regularly holds work spindle and hob spindle run out to less than .0002", work spindle and tailstock spindle alignment to less than .0002". And this standard of workmanship is maintained throughout the machine.

FURTHER

Speed, feed, and indexing each can be selected individually and independently. THINK OF THE TIME TO BE SAVED BECAUSE OF THIS ONE FEATURE!! And scores of additional features are described in our Gear Hobber Bulletin No. 2486 which we will be glad to furnish to you FREE.

ADDRESS

THE HAMILTON TOOL COMPANY 826 South Ninth Street HAMILTON, OHIO

continued

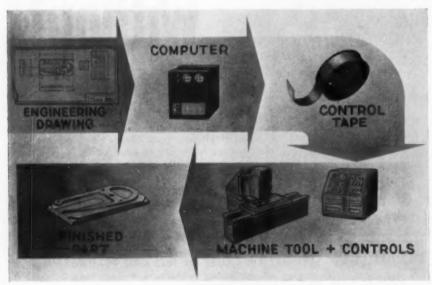
plied to a standard 28" x 96" Cincinnati vertical hydrotel milling machine. Point and path control are provided over the full length of the two horizontal axes of motion, enabling the machine to combine milling and drilling operations with a maximum of speed and flexibility. The head may be positioned vertically in a series of steps or elevations.

The production of a typical template, which requires drilling, scribing, and

milling operations is achieved as follows:

The machinist sets number dials on the tape-reader console, corresponding to the desired part. The tape-reader searches and finds the required portion of the magnetic tape. (Information to produce several hundred different parts may be stored on this tape).

The operator then selects the proper material and cutting tool (drill) from



Numerical Control What it is:

Numerical control is made possible by the development of digital computers and serve controls. It begins with the engineering drawing in a standard form from which number data, representing part geometry, is entered into a digital computer. A control tape is automatically produced and when read by the machine controls produces a finished part. The steps required to go from drawings to the finished part are made as automatic as possible so that human error and skills are minimized.

PORTELVATOR®

The Handy HAMILTON Portable, Elevating Table

A PORTABLE HEIGHT-ADJUSTABLE TABLE

TRUCK

WORK BENCH

for DIE TRANSFER

MACHINE FEEDING

ASSEMBLY AT BEST HEIGHT IN BEST LIGHT

LIFTING

LOWERING

TRANSPORT
of
SHEETS
PLATES
BARS
TUBES

PIPES TOOLS DIES

LOADS

FIXTURES

ALL

COMPACT HEAVY

UNOBSTRUCTED PERIMETER

WORK FROM

MORE SERVICE for LESS MONEY than ANY Other Unit of Equipment



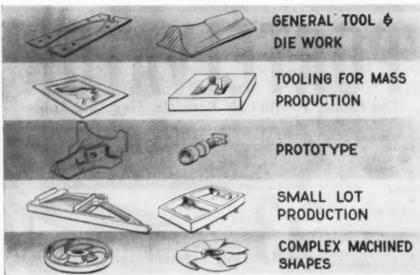
Recent changes and additions to the line provide greater capacities, new flexibility, many bonus features.

Write for NEW, FREE Bulletin P-5604

Address THE HAMILTON TOOL COMPANY, 826 South Ninth Street, Hamilton, Ohio

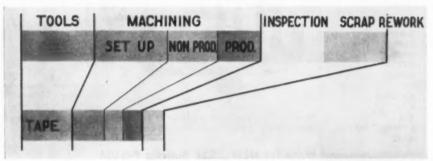


Use postpaid card. Circle No. 302



Numerical Control What it does:

Numerical control is primarily useful in small-lot manufacturing including tool and prototype production. Tools and dies for either small-lot or mass production, prototype parts for experimental and development work, casting and forging cleanup are all representative applications for this technique. In addition, blade shapes and parts designed by digital computer techniques are likely to be well suited for numerical control.



Advantages of Tape Control The upper bar indicates standard methods; the lower, numerical control. Generally, tape costs will be less than the equivalent tool. Set-ups are fewer in number since a variety of operations can be performed in one set-up on one machine. Non-productive time is reduced, e.g., in-process measurement; and productive time is improved because operations are performed at optimum speeds throughout. Inspection may be reduced to "first part" rather than 100%.

Stop tap breakage and scrap

SCULLY-JONES SAFE-TORQUE DRIVERS

NOW AVAILABLE IN NEW STYLES AND CAPACITIES



Heavy-Buty Safe Torque Tap Drivers · Two sizes: top range from 1/2 to 11/2 in.; torque 500 to 2400 in. Ib.

These benefits	for these reasons	result from these PREMIUM f								
PREMIUM TOOL LIFE	Reduce top break- age.	One-shot clutch and cam-drive collet completely disengage tap from driver.								
	Control adverse topping conditions	2. Pre-set torque re- mains constant. Wide range of settings.								
PREMIUM QUALITY TAPPED HOLES	Produce uniform, accurate threads.	 Freewheeling action eliminates impact and objectionable vibration. 								
	Help prevent use	4. Releases instantly at proper setting.								
	of dull or improp- erly sharpened tap, or wrong tap for job.	5. Tension and compression type compensates for feed variation between spindle and tap.								
PREMIUM PRODUCTION EFFICIENCY	Operator gains confidence, more free time for other work.	 No noise or impact on release. Tension and com- pression type spring loaded. 								
	Use higher speeds on all tapping jobs.	7. Operates at any speed taps can take.								
	Reduce down-	 Gives dependable control over adverse ma- chining conditions. 								
	time.	 Quick-change type change tools without stopping machine. 								
PREMIUM PROFIT OPPORTUNITY	Driver has long service life.	10. Freewheeling action minimizes wear.								



or distributor for complete information and prices.

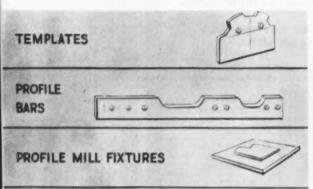
PRECISION HOLDING TOOLS

"Precision Holding" for holding precision

Scully-Jones and Company, 1987 South Rockwell St., Chicago 8, III.







Tools and parts this system will make

Numill produces "flat" parts requiring contour milling, drilling and scribing. These parts may be as large as 8' x 5' in size and of steel or aluminum. There is no limit to the shape. Tolerances better than those achieved by hand methods are obtained. Mirror image parts can be produced from the same tape.

PROTOTYPES AND SHORT RUNS OF PRODUCTION PARTS



instructions which are flashed on the display panel.

The machine automatically drills a series of holes, into which, the operator inserts and fastens lag-screws for holding the material. If additional drilling is required, the display panel will indicate the drill size and RPM to be used—and when these set-up changes are made, automatically drills the required holes.

Subsequent scribing and milling operations are achieved in the same way; the display panel indicates all set-up instructions to guide the machine operator at each stage of the operation.

When these required changes in spindle speed and cutter type have been carried out by the operator, the machine performs its operations automatically.

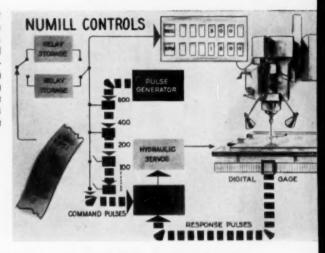
Left-hand and right-hand parts can

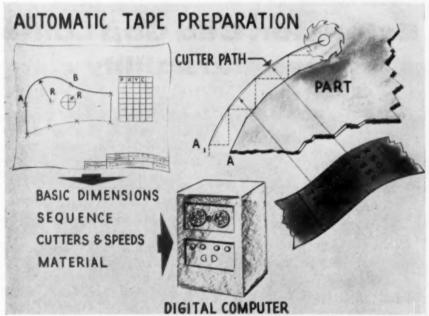
be produced from the same control tape by turning an axis-rotate switch on the tape-reader console.

The Numill machine mills any contour desired at speeds up to 25 inches per minute, (although the capability exists for controlling machine movements at speeds as high as 200-300 inches per minute).

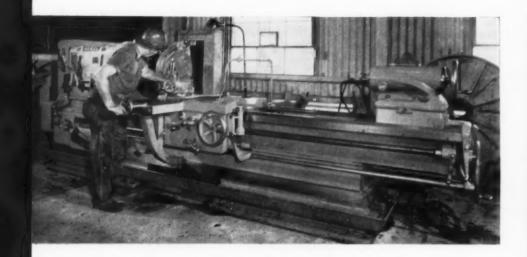
In drilling operations the machine moves from one point to another at 120 inches per minute. After positioning it follows a controlled rate of downfeed. The ability to combine milling and drilling operations in one set-up contributes materially to the versatility and efficiency of Numill in producing tools or parts. This efficiency is further enhanced by the use of the display panel which obtains a highly effective working relationship between man and machine.

The Numill controls convert number data from the tape into appropriate command pulses each of which drives the machine table .0005". A special digital gage senses all actual movement of tape and translates each .0005 of movement into pulses as a check to insure that commands are carried out properly. Numill uses control tapes directly as they are punched by the digital computer.





A look Ahead While the present Numill system is used in a specialized way, many other applications are visualized for these controls. These may involve 2, 3, 4, or 5 axes of control (up to three linear and two angular positions). The system is adaptable to a wide variety of machining requirements of speed and accuracy.



Extension Bed Gap Lathe Proves Versatility . . .

SPECIAL TO MACHINE & TOOL BLUE BOOK

The Koppers Co., Inc. Port Arthur, Texas plant, involved in working with flammable gas at high temperatures to produce polyethylene and ethylbenzene, needed a machine that would face and bore big, odd-shaped parts to .0004" that will contain high pressure gas.

• The experience of Koppers Company—although some of their problems may be unique—can in many cases be extended to manufacturers who have a number of jobs, varying in scope and size, in which they face the problem of accomplishing their objectives with the finest accuracy—and reasonable cost in terms of labor and production.

The Texas plant installed a Nebel extension bed gap lathe which proved to be a "universal" piece of equipment. The 28"/50" Nebel, for example, has 120" centers, 52" swing through the gap and a load-carrying capacity of 5000 pounds,

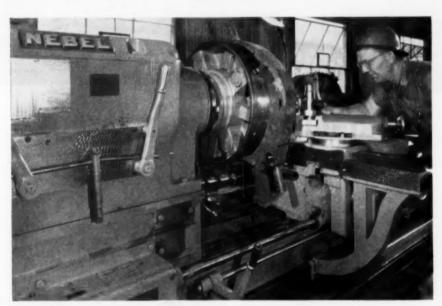
MADE WITH ONE BED SLIDING ON AN-OTHER, the extension bed gap type of lathe presents adjustable distance between centers as well as additional swing capacity within the gap.

OPERATOR FACES A 31" DIAMETER cross head plate for a German high pressure gas compressor. Machining parts like this for containing flammable, high pressure gases calls for accuracy as high as .00040".

all factors which the manufacturer considers necessary to his machine maintenance work.



1. For machining to .0004"



2. For swinging large, odd-shaped parts

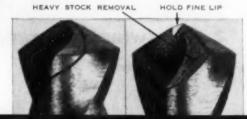


A GRINDING PROGRESS REPORT

Bay State Engineer Finds Way to Triple Production on Chisel Point Grinder

Grinding a "chisel point" on the business end of a twist drill makes it start faster and drill better in hard materials. It's more economical to grind each side of the "chisel" in one cut, as illustrated.

In practice, however, grinding wheels hard enough to hold their corner while cutting the sharp lip, burned the steel in the wide area near the land of the drill. Conversely, wheels soft enough for cool grinding on the land lost their corner rapidly in cutting the lip. In either case, frequent dressing of the wheel was necessary. Because of this, expensive overtime shifts were being worked in an attempt to meet production schedules. Even so, production lagged and rejections were high when Bay State was called in.



Bob Belmont, with 14 years abrasive engineering experience, quickly saw chiselpoint grinding as two jobs in one.

Two jobs are done simultaneously with this wheel having two layers of different abrasives. Fine-hard side grinds the drill tip: coarser-softer side makes heavy cut on the land.



Bay State District Manager Bob Belmont saw this drill grinding problem as it really was . . . two distinctly different grinding tasks being done at the same time. To him, here was a natural spot for the "sandwich" wheel, really two wheels in one, with two different layers of abrasives, each having the exact specifications needed for its part of the job. The "specs" worked out for this actual case show the following important differences:

1. The side used for forming the sharp chisel lip has the highly refined 9A (White) Tool Grinding abrasive, a fine grit size (220), and a "hard" bond strength (P grade).

 The side taking the deep cut on the broad area of the drill land has the less friable 8A abrasive, a relatively coarse grit size (150), and is two full letter grades "softer", (N grade).



With this sandwich wheel, chisel point production rose three times and even more, depending on drill size. In every case, this was more than enough to keep production going smoothly without overtime, and with excellent quality of points.

The job had been a production headache because of just one thing . . . it needed the trained abrasive engineering viewpoint to recognize the dual nature of the job . . . and make it work! This type of alert engineering can be skillfully applied to your grinding. Simply call in your local Bay State Distributor, or write directly to Bay State Abrasive Products Co., Westboro, Massachusetts.

Branch Offices are located in Bristol, Conn.; Chicago, Ill.; Cleveland, Ohio; Detroit, Mich.; Pittsburgh, Pa.; with distributors in all principal cities.

In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ont.



Operators can face high pressure valves, which have as much as a 40" swing, or face press rolls used in the manufacture of polyethylene. They run compressors in the prestage and then to high; are called upon constantly for machining of the parts. As a machine shop, they are responsible for keeping the manufacturing machinery in running order and the gap lathe represents a sizable addition to the other 13 pieces of power machinery used in Koppers' Port Arthur machine shop.

The necessity for a machine which will handle odd-shaped parts is well exemplified by a cross-head plate, oblique shaped and 31" in diameter, which is necessary in order to groove up to 24" for one of their high pressure gas compressors. This cross-head plate represents a \$1200 investment. Its fabrication in the Nebel lathe will allow for ultimate cost and time savings. On the Nebel, at a speed of 30 rpm, the fabrication takes approximately eight hours. On an ordinary lathe it would take twice as long-assuming the lathe had enough swing capacity to accommodate the piece and provided it could be chucked securely.

Similarly, Koppers has an unusual unit made of solid steel, called a star valve. It is a feed valve shaped to resemble a star; an item impossible to swing in the ordinary lathe. Again, they have the problem of machining castings of large centrifugal pumps, which, because of the different volute shapes, are equally difficult to load and to work on the inside.

Because of the unusual nature of Koppers' maintenance machining requirements, they found it difficult to locate job shops equipped to handle their work.

The gap lathe has greatly reduced machine shut-down time.

In this Texas plant, the firm has had to contend with corrosive pump cases, which is a major cause of lost time. Now, with a gap lathe on the premises, they have found they can anticipate trouble and perform preventive maintenance on potential trouble spots. In emergencies, they can machine around the clock, if necessary, and have the pump ready for operation the next day. Formerly it took several weeks to handle these jobs, since the corroded pump cases had to be sent outside the plant for machining.

Koppers Company reports the machine will capably handle Hasteloy (a tough metal which resists erosion), Teflon, Nylon, Lucite, Plexiglas and other plastics from which they fashion gaskets, bearings, conveyor corners and lock-box openings.

HOW WOULD YOU DECIDE

blue book

A roundup of day-to-day in-plant problems and how they were handled by management men. Each incident is taken from a true-life grievance which went to arbitration. Names of some principals involved have been changed for obvious reasons. Readers who want the source of any of these cases may write to MACHINE & TOOL BLUE BOOK.

Case No. 1—If two employees engage in horseplay, should they both be fired?

What Happened:

Roy Olson was a "card." He liked to fool around and tease people. His specialty was teasing the female employees in his department. His supervisor talked to him a few times but never took any other action.

One day Olson picked up an empty wire spool and "playfully" tossed it at Mary Wellus. It hit her in the thigh. She wheeled around, grabbed the spool up off the floor, wound up like a pitcher and heaved it back at Olson. The toss narrowly missed the head of another worker. The foreman felt he'd had enough of this sort of nonsense, and fired both employees.

Olson took what was coming to him without complaint, but Mary filed a grievance. She argued:





Use postpaid card. Circle No. 305

Right or Wrong

continued

- I didn't start the horseplay, so I shouldn't get the same penalty as Olson.
- I got no warning. Supervision knew that horseplay was going on and never did anything about it.

The company backed its supervisor. It maintained:

- Mary's action almost injured another worker.
- She should not have reacted in kind but should have told her supervisor about Olson's childish behavior.
- 3. She knew that horseplay is

a serious offense. It is in the company rulebook.

Was Mary:

RIGHT | WRONG |

What Arbitrator Harold C. Havighurst, Chairman, Arbitration Board Ruled:

"Roy Olson, from the time he came to Warwick, had engaged in a vicious form of teasing directed toward all female employees who worked in his vicinity; he had subjected Mrs. Wellus to repeated annoyances; supervisory employees had known of this situation at least to some extent, and they had done nothing about it. These facts place a measure of responsibility upon the company for the incident, which we believe it is proper to take into account in connection with

the question of justification for the dis- stated without loss of seniority and with charge. Mary Wellus should be rein-

back pav."

Case No. 2-Must an employee wait for a merit increase after his work has improved?

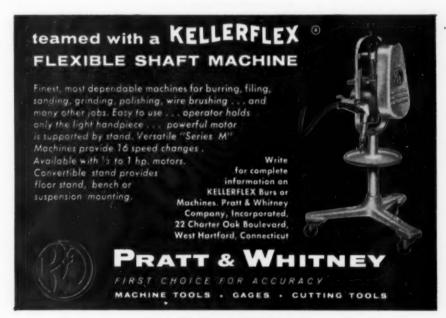
What Happened:

There was a merit increase plan for salaried clerical employees at a large industrial plant. Under the plan, two automatic raises were given to the employee within the first year. After that, his progress to the top rate range depended strictly on merit. Provided that its judgment was not "arbitrary or capricious," management made the decision about an employee's merit.

Bill Rosser felt he was not getting a fair shake because he had received no merit increases. So he



filed a grievance. While the grievance was pending, his work improved in a great degree, and after about 16 months he was raised to the top of his range.





Use postpaid card. Circle No. 307

Right or Wrong

continued

But this did not settle the matter. Rosser felt he should have received the increase much earlier. It was admitted by both sides that the improvement in his work had developed about nine months before he got the raise.

Was The Employee:

RIGHT □ WRONG □

What Arbitrator Ralph T. Seward Ruled: "The evidence does not convince the Arbitrator that the denial of Rosser's initial request for an increase was the result of a 'freeze' on merit increases

instituted by management, or, that it was motivated by any reasons other than supervision's opinion that he did not then deserve to be raised to the top of the range.

"From the evidence presented, the Arbitrator believes that the opinion was reasonable and that there was no contract violation to Rosser at that time. On the other hand, the Arbitrator cannot uphold management's delaying the increase as long as it did. Management concedes that Rosser's performance improved sharply nine months before his raise was granted, and continued at the improved level thereafter. Though the company was entitled to wait a reasonable time to make sure that the improvement would be lasting, the Arbitrator cannot hold that a nine-month delay was reasonable or justified. Rosser shall be paid for the salary lost for six months."

Case No. 3—Is discharge a proper penalty for insulting a customer?

What Happened:

John Salters' job was to service the company's products. One night while he was on duty, a customer called up and asked him to come right over and fix one of the machines which had recently been purchased. John said he couldn't make it right away as he was alone and had to wait for somebody to replace him.

The customer reminded John that the contract called for quick service. John said he didn't care what the contract said—he would come over when he had time. And then he hung up. The customer



complained about the lack of courtesy and John was fired. He put in this grievance:

 Sure I was "fresh" but only after the customer got "tough" over the phone.

2. This is a first offense, so I



continued

shouldn't get fired.

Management said that customers are the "bread and butter" of the business, and they couldn't afford to give second chances. Also, an employee has no right to "talk

back" to customers.

Was The Company: RIGHT □ WRONG □

What Arbitrator Martin J. O'Connell Ruled:

"There is a responsibility on every employee, not only to faithfully perform



all duties assigned to him, but also to render such services as will contribute to future business for his employer—so necessary in these competitive times and also will bring greater job security to the employee and his fellow workers.

"If the work or attitude or remarks of an employee results in decreasing business for his employer, it may not only affect the success of the company but may seriously jeopardize his own position. Most employees are conscious of these facts and strive to be 'goodwill' salesmen in a praiseworthy effort to enhance their advancement and the continued growth of the concern which employs them. I find that, notwithstanding Mr. Salters' denials, he made the remarks attributed to him, that they did offend a customer, that he did not attempt to assist a customer in distress, and that the continued employment of Mr. Salters might result in loss of business. Discharge was for just cause."



NEW METHOD ROLL MARKER SLASHES COSTS

eliminates secondary O.D. marking operation

- · for screw machines, lathes, etc.
- completely automatic easy to set up
 - quick roll die change interchangeable dies
 - adjustable impression depth
 - heavy-duty construction

Write today for Bulletin 500-C Inquiries from Sales Reps. invited



NEW METHOD STEEL STAMPS INC.

147 JOS. CAMPAU . DETROIT 7, MICH.

Use postpaid card. Circle No. 310

FORMING and FABRICATING



alog . . . packed with time saving "Die-Less Duplicating" techniques

O'NEIL-IRWIN MFG. CO.

METALWORKING MACHINES

Consult the yel-low pages of your phone book for the name of your nearest Di-Aere distributer er write us.



314 EIGHTH ST. LAKE CITY, MINN.















Pewer Parter 1 Model







Power Notcher 1 Model



Power Press Brake 1 Model







Power Punch 2 Models







Powershear 4 Models

SHOP HINTS AND KINKS

MACHINE AND TOOL

blue book

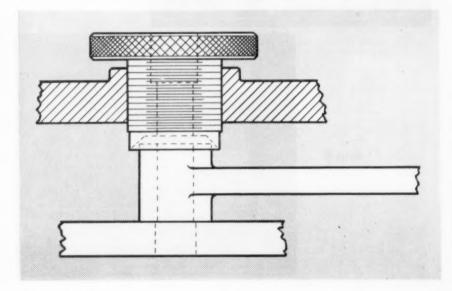
Special Drill Bushing

By Henry George

• We recently solved a production drilling problem by means of a tricky little drill jig, enabling us to drill out a large number of links. The hole was to be square with the faces and centered in the link end. We accomplished this by making up a special drill bushing. It is threaded, as shown, on the O.D. and has a large diameter knurled head. Because of the length it is counterbored to reduce the rubbing on the drill. The lower end is chamfered on the LD, as shown. When in use the

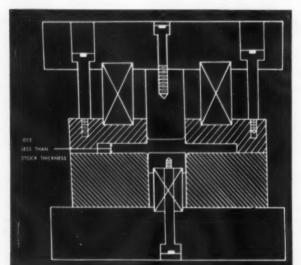
work is slipped under the bushing and is locked in place by screwing down the bushing. A raised shoulder on the top section of the jig surrounding the bushing keeps the chips out of the threads.

Additional refinements can be made such as pins to approximately position the link end before the bushing is screwed down. A more elaborate seal to keep the chips out can be used if desired.



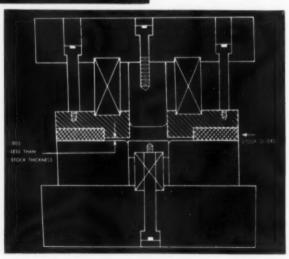
Minimize Pressure Pad Rocking

By E. W. Pochervina



Sketch A.





When making a progressive die of seven stations, if you channel out your pressure pad as shown in Sketch A, you will decrease the rocking action considerably when starting stock to be worked on first few stations, but still maintaining maximum pressure on stock.

For example on a seven station die with a flat pressure pad with close fits between die members and pressure pad, and working .065 stock, when you make a hit on the first station your pressure pad tips from at least .065 to .00 over length of die. With pad chan-

neled as shown in sketch, the tipping is cut down to .005 at draw one to .000 at station seven.

With this tipping action reduced the other die members are not being pushed out of line.

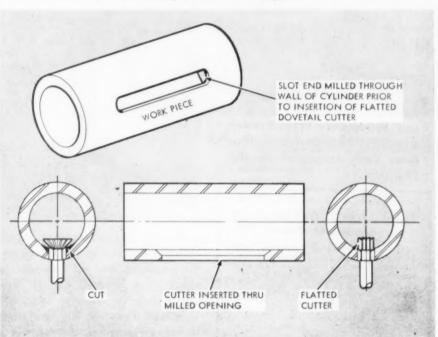
This same idea can be used with a flat pressure pad if the die is designed with stock guides built onto the die block which are made to be .005 lighter than metal. Or you may channel the pressure pad as shown in Sketch B, when using stock guide parallels.

Machining a Blind Angular Seat

By H. J. Gerber

• This job involved the cutting of an

angular seat throughout the length of a blind slot through the wall of a tubular work piece.







THAT'S ALL IT COSTS

TO CUT A KEYWAY

WITH THIS KIT



One cent and one Minute Man Keyway Broach Kit - that's all you need to cut a keyway from 1/16" to 1" in any bore from 1/4" to 3". And it takes only one minute.

Minute Man Broaches for square and hexagonal holes and Production Type Keyway Broaches are also available from stock at your Industrial Distributor's.

The duMONT CORPORATION Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICELIST T describing Square Broaches, Hexagon Broaches, Production Type Key-way Broaches and Keyway Broach Kits to

Company	 *		*	*						,		*		

Use postpoid card. Circle No. 312

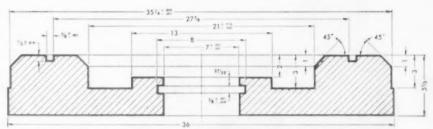
Shop Hints

continued

There was seemingly no available tool which would get at this internal 60 degree angle seat unless it would be a back spotface type of tool which could be installed on the shank from the inside. No tool of this sort was at hand but a 60-degree shank type dovetail cutter was available. It was decided to grind off the teeth on two opposite sides of this cutter so that it could be inserted through the slot from the outside.



The job was set up in a vertical miller and no trouble was experienced in machining the small number of work pieces required. Enough teeth remained on the cutter to do an efficient and clean job in two passes through the length of the slot. . . .



Certainly you can use Microbore Tooling on a Vertical Boring Mill

HERE'S HOW KING DID IT!



24 OPERATIONS BY CLUSTERING MICROBORE UNITS IN 6 BARS

- This tooling for a difficult job was designed and made by the Microbore Division and was used with great success by the King Machine Tool Division of American Steel Foundries. Notice that boring, facing, chamfering, turning and grooving operations were required and precise limits were held.
- The simple setup and quick adjustment of

each individual Microbore unit resulted in a minimum of down time. This is typical of reports from shops where the Microbore System is used. Microbore is a basic tool which can be applied singly or in clusters for all types of precision boring, turning and facing operations.

 Proposal engineering from your prints and machine data is a unique feature of the DeVlieg Microbore System. Discuss your tooling problems with our specialists or let us send you our informative catalog.

DEVLIEG MICROBORE SYSTEM

DEVLIEG MICROBORE . DIVISION OF DEVLIEG MACHINE COMPANY

2720 West Fourteen Mile Rd., Royal Oak, Michigan

Use postpaid card. Circle No. 313



COSTS



Quick change cuts costs on short runs: at Silent Hoist & Crane Company, Brooklyn, N. Y., for example, 25 seconds is all the time needed to change cutter speed, depth of cut and rotary feed for different sized sprockets.



Five times faster than the machines they replaced on a variety of jobs, 36-Type Gear Shapers set many cost-cutting records at New Process Gear Co., Syracuse, N. Y. Part shown cut in one operation. Rate: 135 finished per day.



Faster on gears up to 35" P.D., two 36-Type machines replaced five older machines at Samue M. Langston Co., Camden, N. J. 22-256" P.D. 4 D.P. steel spur shown is cut in 2½ hours Production time on previous machine—10 hours

TH PRECISIO LIN

WAYS

FELLOWS 36-TYPE GEAR SHAPER



Heavy cutting power: 36-Type Gear Shaper removes 93 cubic inches of stock (26 lbs.) from the blank in just two cuts to make this 25.3' P.D., 3 D.P. gear at Fairfield Manufacturing Co., Lafayette, Ind. Total time: 258 minutes



More efficient small gear cutting, too: 57 minutes is all it takes to cut each hand of this 6.486° P.D., 5/7 D.P.; 23° H.A., herringbone pinion at Snow-Nabstedt Corporation, Hamden, Conn., on their 36-Type Gear Shapers.

Here's the way to lower gear production costs even though over-all costs keep rising! These major firms (and many others) have proved that fast, accurate Fellows 36-Type Gear Shapers have the power, speed and versatility to cut production costs . . . often by more than 50%!

Set-ups are fast and simple for a wide range of jobs up to 36" P.D. Cutter speeds from 18 to 300 strokes per minute are available through a selector dial. Four rotary feeds are available through a feed lever, additional feeds through two pick-off gears. Semi-automatic fixtures may be used to decrease loading time.

Whether for long runs or many varied jobs, the powerful, versatile Fellows 36-Type Gear Shaper can very probably lower your gear production costs. Your Fellows Representative can give you valuable facts and figures about the benefits of investing in the Fellows Precision Line of gear production equipment. Write, wire, or phone any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY 78 River Street, Springfield, Vermont Branch Offices: 1048 No. Woodward Ave., Royal Oak, Mich. 150 West Pleasant Avenue, Maywood, N. J. 5835 West North Avenue, Chicago 39 6214 West Manchester Avenue, Los Angeles 45

Cours Gear Production Equipment

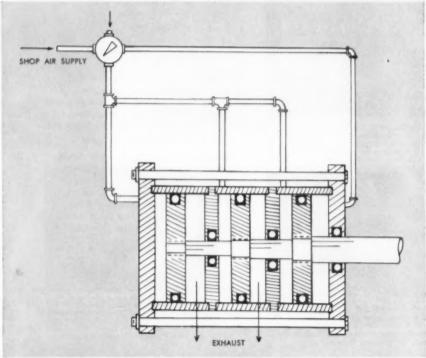
Air Operated Holding Fixture

By Clifford Molley

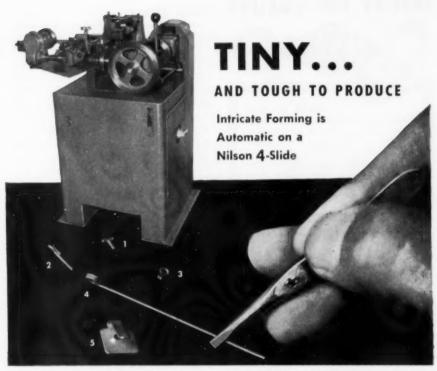
• We make use of a lot of air operated holding fixtures in our shop for various machining operations. On a recent milling operation we found we needed a rather high clamping pressure while the space limitations prevented the use of a large diameter air cylinder. We beat this problem with a shop built cylinder that provides about 3 times as much pressure as a regular cylinder of the same diameter.

It consists of a piston rod stepped down to provide 3 shoulders. There are three pistons threaded against the 3 shoulders. The cylinder itself is made of two end caps and three cylindrical sections. "O" rings are used to seal the pistons in the cylinders and the piston rod in the head and in the dividing plates. The whole assembly is held together with tie rods through the end plates.

On the forward stroke air is fed in above each piston and the air below each piston escapes as the piston moves forward. For the return stroke we found it sufficient to use just one sec-



SHOP BUILT CYLINDER provides 3 times more pressure, and consists of a piston rod stepped down to provide 3 shoulders.



Small wire and ribbon metal forms shown here in actual size are typical examples of modern precision production on a Nilson #00 4-Slide. Compact in size, this 4-Slide produces up to 375 pieces per minute in material not exceeding .040 dia. and 3" in blank length. Easily access to tooling, accurate feeding to within .003, and rugged construction assures years of precision forming.

- 1 Mercury Switch Part014" x .019" platinum wire, formed with tolerances within .001" on over-all length. Production rate, 175 per minute.
- 2 Electrical Contact0076" x .0030" wide phosphor bronze formed at a production rate of 200 per minute.

- 3 Swivel Part....025" brass wire. Heading operating includes eye formed with tolerances within .008", shank within .003 tolerance. Production rate, 300 per minute.
- 4 Leadwire026" soft tinned copper wire formed at a rate of 140 per minute with two 7/64" diameter windings.
- 5 Contact Part010" x %" wide phosphor bronze formed at 175 per minute.





1511 RAILROAD AVENUE, BRIDGEPORT 5, CONN.

Automatic Chain Making Machines • Staple Forming Machines • Wire and Stack Roots • Wire Straightening Equipment • Slide Fonds for Presses • Wire and Ribbon Stack Forming Machines

SPECIFY TOP QUALITY



ARBOR SPACERS

SHIMS and SPACING COLLARS • Arbor Spacers and Shims in 20 sizes and thicknesses from .001" to .125". Arbor Spacers furnished with standard keyway; Shims, with no keyway. Also Spacing Collars in numerous popular diameters, and in thicknesses from ½" to 3". Hardened and ground; edges chamfered. Furnished with standard keyway.

FEELER STOCK .

Made from tempered stock, rolled to close tolerances, ½" x 25' coils packaged in transparent plastic boxes, except above .020". Strips ½" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)

SHIM STOCK .

Steel or brass. Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses, .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in two assortment packages—12 thicknesses, .001" to .015", and 15 thicknesses, .001 to .032".

WRITE FOR
Illustrated Brochure
and Price List!



DETROIT STAMPING CO.

347 MIDLAND AVE. . DETROIT 3, MICH.

Use postpaid card, Circle No. 316

Shop Hints

continued

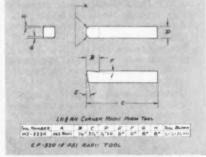
tion. This arrangement saves on air. For more power on the return stroke, more sections can be used. With the stepped piston rod the thickness of the rod increases at each piston. This is as it should be, for the compression in the rod increases as it passes through each piston. In spite of the high force developed, each piston and cylinder section has only to resist the forces developed by the shop air pressure, that is the pressure does not build up.

The unit we built has three sections as shown on the drawing. Of course the same construction can be used for units with 2, 3, or more sections depending on the pressure requirements. This unit gives good service and was inexpensive to build.

Reduce Cost of Radii Tools by Making Two in One

By Edward McIntyre

 When making female radii tools for use on turret lathes and screw machines, it is well to start setting up a



SKETCH SHOWS HOW TO make two radius tools in one in order to reduce costs.

continued

chart listing the radii standard to your own requirements and then proceed with your tool grinding.

Radius tools are rather expensive to make, however the cost can be reduced by making two in one, as shown on the chart.

Once the grinding wheel has been

dressed to a specific radius, it is relatively simple to grind into the tool, both a right hand and a left hand radius. The job at hand may require only a right hand radius, but it is reasonable to assume that a left hand radius will be required in the future, and it can now be made on the same tool bit with the same setup at a fraction of the cost of making it at a later date.

FFECTIVE FFICIENT CONOMICAL

way to HOLD your work—and your business with

Lagar.

Don't be caught short! Keep a supply of Zagar collets on hand. Five types: No. 310 Zagar Master; Nos. 2 and 6 W. & S.; No. 5-C; No. 6 W. & S. pads. All but Zagar No. 310 are standard machine tool sizes. All collets are made of oil-hardened tool steel; have flat tops for locating purposes.

Write for Zagar Catalog B-2.

ZAGAR STANDARD MACHINE TOOL SIZES FIT ALL MAKES



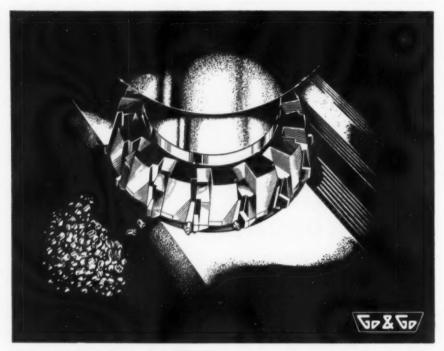


Order by mail for shipment from stock.

ZAGAR, INCORPORATED
23900 Lakeland Blvd., Cleveland 23, Ohio

TOOLS FOR INDUSTRY and SPECIAL MACHINERY

Use postpaid card. Circle No. 317



"MASS PRODUCTION MANIAC"

That's the inserted blade carbide tipped milling cutter. Here's a tool that really outperforms ordinary milling cutters when it's used right. It makes possible increased production with more pieces per grind and better finishes at lower cost.

Economical milling with carbides requires careful tool engineering. This has been recognized for many years at Go & Go. Failure to do so has soured many a carbide application.

Go & Go produces a complete line of inserted blade carbide milling cutters including tools designed for specific jobs (specials). We think they're the finest you can buy because sound engineering comes with these cutters. If your application isn't right for them, we'll tell you so. And we'll tell you how to make it right.

For specifications on a really complete line of inserted blade carbide milling cutters, ask for Catalog "F". Or better still, consult the Go & Go engineering sales representative in your area.

GODDARD & GODDARD COMPANY

Engineering and producing tools that Go & Go since 1917

FIELD REPORTS OF EQUIPMENT IN ACTION

MACHINE AND TOOL

blue book

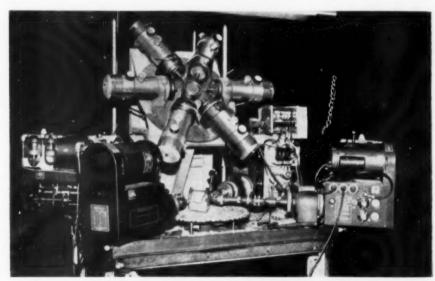
Standard Components Give User Quick, Low-Cost Special Machines

Los Angeles—Presto Line Corp. is combining standard machine units with fixtures to provide special machinery set-ups for a multitude of production work at higher rates and at a lower per-piece cost.

They use three types of easily obtained automatic drilling units, all from

the same source. These are combined into the unique, special machine setup as illustrated. On it, zinc die castings are recessed, tapped and drilled in one continuous operation handled by one man. About 260 to 360 pieces flow through this set-up with no scrap losses and with tolerances held well within the specifications.

The set-up consists of two Dumore Series 24 automatic drill units mounted on a work table with simple nose brackets, one on the right front corner and the other located diagonally opposite.



THREE TYPES OF AUTOMATIC DRILLING UNITS are combined into one special machine set-up.

THRIFTMASTER

your source for

dependable DRILLHEADS

Universal Joint Type

Drillhead . . Full Ball or Branze Bearing Construction, Standard or Heavy Duty. From ½" minimum centers up. Capacities to ½" in Steel.





Single and Double Eccentric Type Adjustable
Drillhead . . Enclosed,
Full Ball Bearing Construction, New Double
Eccentric Type illustrated.

Special Fixed Center Drillhead . . . Made to your requirements. Full Ball Bearing Construction.



- We stock or can build the right drillhead for your jobs.
- Write for your free copy of the THRIFT-MASTER CATALOG or phone for a rush, on-the-spot quote.

Also Makers of DORMAN Automatic Reverse Tappers



1030 N. PLUM STREET . LANCASTER, PA.

Field Reports

continued

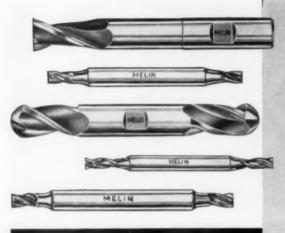
These recess both ends of the castings with Tru-Arc tool attachments at the same time. On the other two corners, also diagonally opposed, are two Dumore Series 28 "Drill-N-Tap" units which tap both ends of the castings simultaneously, after they are indexed automatically from recessing position. A cam operated by a small electric motor controls the operation of both the No. 24 and the No. 28 units. The operator then places the workpiece on the fixture above, consisting of six Dumore Series 20 Automatic drill heads which drill six 3/32" holes in each piece simultaneously.

While the table set-up is recessing and tapping pieces, the upper set-up of six drill heads, drills the six holes required. One operator easily handles the workpiece twice, but in what is practically one continuous operation. To all intents and purposes the drilling is a relatively free operation.

No Clapper Box Delays

ROCKFORD, ILL.—Here's how the chips flew when a special quick-change tool holder for planers and a specially-designed carbide tip was tested at the plant of Rockford Machine Tool Co.

The holder and special design 2-inch diameter Carboloy 370 carbide button, developed by Apex Tool & Cutter Co., Shelton, Conn., are shown taking a 5/8-inch depth of cut on a 1x4 foot Meehanite test block at a feed of 0.060-inch, with planer table traveling 300 fpm. Complete cut was made across



MELIN END MILLS



There is a difference in end mills . . **MELIN** end mills! Proof of this is evident in the continued increase in MELIN popularity. The growth in **MELIN** tool acceptance was by no means an accident . . . The secret is in CONSISTENT QUALITY, This standard of Quality assures you better performance . . . longer lasting performance . . . CONTINUOUSLY. from one shipment to another. Next time you order end mills . . . specify the finest specify MELIN.

MANUFACTURED IN TWO, THREE AND FOUR FLUTE TYPES.

Representatives in principal cities.



MELIN TOOL COMPANY, INC.

3374 West 140th Street Cleveland 11, Ohio



QUICK CHANGE tool holder for planers and carbide button take 56" cut on a 1 x 4 foot Meehanite block. Feed: .068" with planer table traveling 300 fpm.



entire casting with no breakouts, and practically no wear on the carbide tool. Straight, rear lock holder employed permits fast tool indexing without removing it from planer clapper box.

Other shape tool bits, either with carbide tips or of high speed steel, can be changed in holder without it being removed from the machine.

HEATS FAST SAVES TIME

NUMBER 142 HEAT TREATING FURNACE

Powerful burners in this efficient furnace get heat up to the 1300°-2350° F. range in minutes. Temperatures accurately and quickly regulated. Does fast job with high speed and carbon steels. Ratchet-operated door opens upward. High temperature, refractory-lined firebox is 7" by 13" by 16½". 200,000 BTUs per hour. Carbo-frax hearth, G.E. Motor and Johnson Blower included, F.O.B. Factory\$337.00 Write today for free Johnson Catalog

JOHNSON GAS APPLIANCE COMPANY 570 E Avenue NW, Cedar Rapids, Iowa



Use postpoid card. Circle No. 321

을 engineers and builds

Different motorized and Belt Driven

one of which may be just the one to LOWER YOUR PRODUCTION COST

Here are only a few representative Pope Precision Spindles:



FOR SURFACE GRINDING

POPE 1, 2 and 3 HP Totally Enclosed 1880 and 3600 RPM Motorized, Cartridge Type Spindles with double row cylindrical roller bearings of enormous capacity for superior performance and long life, plus separate thrust bearings for no endwise movement of the shaft.



FOR HEAVY DUTY MILLING AND GRINDING

POPE % to 100 HP Direct Motorized Spindles operate in any position flanged or tapered noses - equipped with super-precision, double-row roller bearings and preloaded ball thrust bearings. Top quality performance is assured on skin milling, grinding, boring and other operations as well as milling.

FOR TOOL AND CUTTER GRINDING

POPE Super-Precision 1 HP 3600 PPM Muturized Tool and **Cutter Grinder** Clearance Angle **Swivelling Heads**



provide angular adjustment in a vertical plane. They pay for themselves in time saved. Cup wheels can be used for practically all clearance angles.



FOR BORING ROUND HOLES WITHIN MILLIONTHS OF AN INCH

POPE Heavy Duty Boring Spindles assure smooth, chatter free, continuous high production of accurate parts. Belt driven or motorized, in a wide range of horsepowers and speeds.



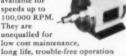
FOR INTERNAL GRINDING

POPE Precision Internal Grinding Spindles have the super-precision bearings to withstand both axial and radial loads and to produce better finished ground holes. Their ability to take heavy cuts means increased production. Wheel life is increased, too. For Bryant, Cincinnati, Excello, Heald, Landis and Norton Grinders.

FOR HIGH CYCLE GRINDING AND MILLING

POPE Super-Precision, High Frequency, Heavy Duty Spindles are available for

speeds up to 100,000 RPM. They are unequalled for low cost maintenance,



and rugged ability to cut metal fast.

Send us your specifications and get prompt quotations on the one best Spindle for you out of the 20,000 different Precision Spindles that bear the name "POPE."

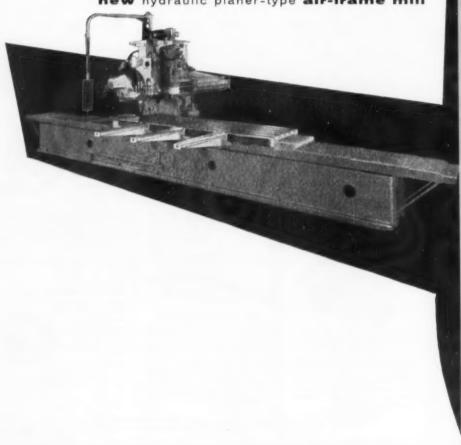
No. 116

POPE MACHINERY CORPORATION

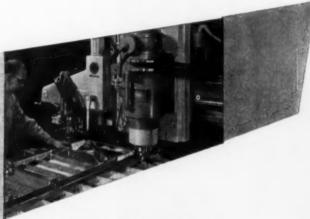
261 RIVER STREET . HAVERHILL MASSACHUSETTS

Use postpaid card. Circle No. 322

new hydraulic planer-type air-frame mill



for fast, high-precision machining of aluminum air-frame parts



Specifically designed for fast, high-precision machining of variable and complex, 3-dimensional shapes, this new air-frame mill speeds the machining of aluminum air-frame parts. Equipped with a highly sensitive, 3-dimensional hydraulic tracer valve for contour work, the machine also has a depth control valve for 360° tracing. Machining is traced from wood, plastic, metal, plaster of paris models, or actual parts. Available in sizes to 36" x 36" x 10 feet.

Features

30 HP Hydraulic

Counterbalanced Head Controlled Pressure Lubrication 4-Position Depth Control Turret Interlocks "To Fail Safe" Swiveling Pendant Panel Mounted Valves

Accessories

Telescoping Way Guards Template-Support Brackets Spray Coolant for Milling Cutter

QUICK PACTS

Call 3-7611 Rockford, Illinois

Or write direct for a representative to call with detailed specifications.

ROCKFORD MACHINE TOOL CO.

RECO KIEHWAUKEE STREET A BOCKFORD, ILLINOIS

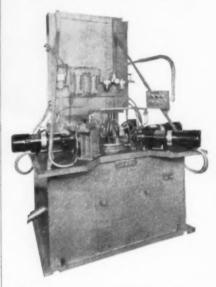


Field Reports

continued

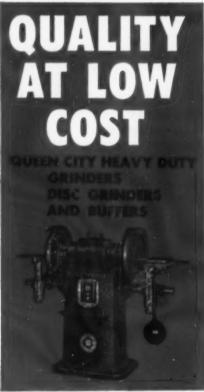
Performs 6 Operations On Automotive Part

Detroit—Incorporating five Govro-Nelson automatic drilling units, to-gether with a power saw, a new machine developed by the Govro-Nelson Co., drills, tap drills, taps, taper reams, slots and deburrs a steel automotive part in the above order, performing the six operations on 700 parts per hour.



The operator merely clamps the part in the machine. All operations are performed automatically.

By making changes in the number and arrangement of the drilling units, the machine is adaptable to a variety of operations.



QUEEN CITY Heavy Duty Disc Grinders and Buffers save you money when you buy and during every hour of use. Ruggedly designed, they feature heavy duty bearings and motors. So good they're offered on a 30-day trial, yet priced 20 to 30% under competing makes.

Choose from the complete range of QUEEN CITY Grinders and Buffers . . floor and bench types . . . in sizes from 1/3 to 10 H.P.



WRITE FOR FREE CATALOG TODAY!

QUEEN CITY MACHINE TOOL CO. 3912 Kellegs Ave., Cincinneti 26, Ohio

"High Quality—Low Cost—For Over 50 Years"

Use postpaid card. Circle No. 324

Sawing Machine **Reduces Cutting Time** More Than 75%

RACINE, WIS .- In order to eliminate human error in the sawing of pieces used for a lock ring on their models 2UV and 2UVR milling machines, the Tree Tool and Die Works has installed a Peerless Speedy-Cut Metal Sawing Machine.

Four cuts are made in each ring with such precision that at the present time the parts resulting from these cuts can be interchanged. In addition, the squareness of the cut eliminates the discing operations previously necessary. A special revolving fixture mounted in a cross slide is so arranged to permit the sawing of any angle in any position.

The individual cuts which previously



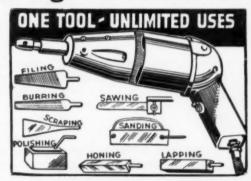
took a total of 12 minutes are now made in a total elapsed time of 2-1/2 minutes by actual test. The result is not only a great saving in labor costs, but higher quality parts as well.

B-R-E-A-K . . Hand Finishing Bottlenecks

Portable Electric Reciprocating Tools

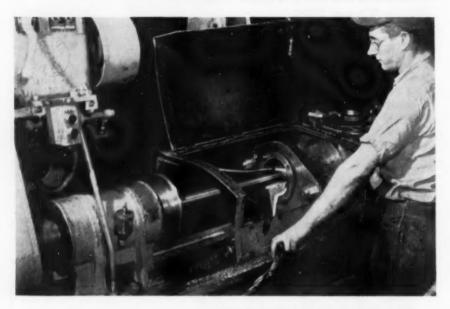
These handy tools will cut out many tedious hand filing and finishing operations — Increase Production - Produce Uniform Work

Light in weight-Delivers 1/8" or 3/8" fixed stroke at 1000 strokes per minute—Operates on 110 volts AC or DC.



E TOOL CO

Adapting Lathes for



1. Tubes

LATHE SETUP used for boring hydraulic cylinders of different sizes and lengths. Cylinders are clamped between the tailstock and a center support and fed hydraulically into the tool on a boring bar rotated by the spindle.

By **H. Steel,** General Foreman Clark Equipment Company, Battle Creek, Mich.

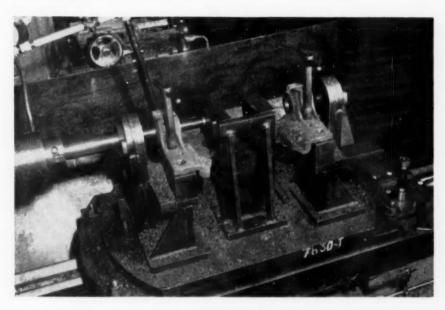
• In plants such as Clark Equipment Company's in Battle Creek, Mich., that build Clark lift trucks, runs are commonly quite short, hence setups must be changed often. Usually, such conditions pre-

clude special purpose machines, unless they can be improvised by using chiefly existing machines adapted to the particular uses.

One such lathe, Fig. 1, is employed in the plant named to bore tubes that become hydraulic cylinders in lift trucks.

Cylinders of many different lengths and bore diameters are needed but nearly all can be bored

Boring ...



2. Castings

FIXTURE APPLIED TO THE TURRET of a reconstructed lathe and used to hold castings in which bearing holes are to be bored, using a bar driven by the spindle. After one bearing is bored, the fixture is indexed 180 deg. and then the other is bored in a repeat operation.

precisely in a lathe whose bed has been extended so that long cylinders can be handled. Before reaching the lathe, the tubes are cut and faced to length and have ends turned concentric with the bore partly to insure proper location in the lathe.

In this lathe, the headstock has been elevated to take larger diameters than the original lathe would accommodate; the tailstock does not have the usual center but is bored out to pilot the outer end of the boring bar. This bar is centered in and driven by the headstock spindle and passes through a support somewhat like a steadyrest but arranged to be fed along the bed.

Tubes to be bored are clamped axially and hydraulically between the support and the tailstock, being piloted on the turned ends. Then, hydraulic traverse of the assembly feeds the tube into the tool as the support and tailstock are moved along the bed with the work piece that they support. Feed of the tube over the boring tool, sizes the bore. Coolant is fed continuously to the tool and flows out of the inner end of the tube along with the chips produced.

Although the headstock can be driven at different speeds, it is commonly operated at one set speed and the hydraulic feed is varied to suit cutting conditions. At the end of the cut, the tube is unloaded without pulling the tool back through the bore as this avoids marking the bore. Operation is convenient and good bores are produced rapidly.

Another lathe has been altered to accommodate the fixture shown in Fig. 2, used in boring bearing holes in a casting.

This fixture is mounted on a turret so that it can be turned end for end, precisely 180 degrees and permit the boring bar to enter holes at each end of the casting. There are pilot bearings for the bar at each end of the fixture as well as between the two holes that are bored.

To bring the boring bar to desired height, the headstock has been elevated and the spindle carries a bayonet coupling to drive the bar and to facilitate disconnecting the bar when the fixture is turned. When a casting to be bored

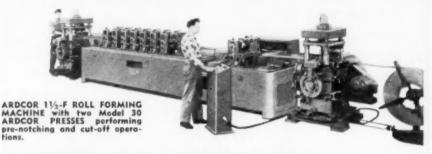
is bolted in the fixture, the boring bar is passed through the cored bearing hole and is piloted at both ends, as Fig. 2 indicates. Then the turret and fixture are fed hydraulically toward the headstock as the boring tool makes its cuts.

After the hole at one end is bored, the bar is removed and the turret and fixture are indexed 180 deg. after which the hole then toward the headstock is bored in the same way as the first hole. This setup insures bores that are in line although they are machined from opposite ends of the casting. It is also possible to use a bar having two cutters and that runs through the whole length of the fixture. For the casting shown, however, successive boring of the two ends, as described, is more convenient.



"I just couldn't wait for the boss to meet you, honey."

ARDCOR Roll Forming Mills



COMPARE These Exclusive Features

UNIT DESIGN-spindles in self-contained SEPARATE HOUSINGS, with speed reducers. Easily removed or replaced.

LARGE RANGE OF VERTICAL ADJUSTMENT through toggle gearing.

DOUBLE BEARING DESIGN OF DRIVE HOUSINGS adds greatly to rigidityincreases bearing and gear life.

ALL BEARINGS ARE ANTI-FRICTION-no sleeve bearings, even on idler gears. MICROMETER TYPE DIALS assure a positive setting both on drive and outboard housing.

LARGEST MACHINES EVER BUILT THE ONE OF ROLLS FLOORING, ROOF DECK . . .



tions.

Left: One of three mammoth ARDCOR Roll Forming Machines designed to form steel roof deck and flooring up to 132 ft. per minute. Entire production line 180 ft. long; approximate weight of equipment, 300 tons.





Consult our Engineering Facilities, without obligation . . .

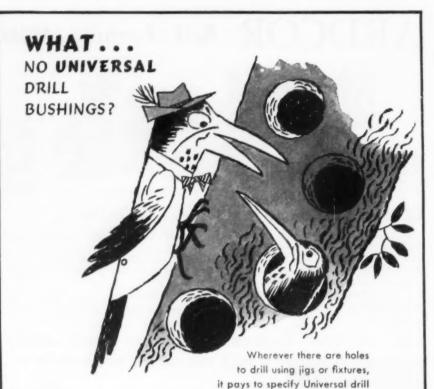


merican ROLLER DIE CORP.

29560 Clayton Avenue

Wickliffe, Ohio

DESIGNERS AND MANUFACTURERS All Sizes and Spindle Dismeters of Ball Farming Machines, Walded and Lectng Ralls. Tubing and Pipe Ralls . Straights



bushings. Machined from finest quality steel, Universal bushings have super-finished bores which lengthen tool life and reduce bushing wear over long production runs.

Knurled heads provide quick, sure grip. Blended radii on top-inside diameters help prevent tool hang-up and breakage. Standard sizes and lengths in stock for immediate delivery.



FREE UNIVERSAL SELECTOR. Gives all engineering data for selection of all types and sizes of drill bushings up to $1\frac{3}{4}''$ drill size. Send request on your company letterhead.



UNIVERSAL ENGINEERING CO. FRANKENMUTH 10, MICHIGAN

198

FREE LITERATURE

MACHINE AND TOOL

blue book



(See Number 1.)



(See Number 2.)



(See Number 3.)

- 1. Die Casting Machine Model 600 incorporates many unusual features. Two ten gallon accumulators provide the speed of shot required to produce "hardware finish" castings. Bulletin from Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, O.
- 2. Multiple Transfer Presses. Comprehensive booklet lists latest developments in Baird line of automatic multiple transfer presses, details their basic principles of operation. Baird Machine Co., Stratford, Conn.
- 3. Reinforced Abrasive Products. Catalog of reinforced resinoid abrasive products, which have become an essential part of foundry, welding, and metal fabrication industries, is offered by the Bay State Abrasive Products Co., Westboro, Mass.
- 4. Metal Sawing. Revised 36-page edition of "Handbook of Metal Sawing" covers the proper selection and use of hand and power hack saw blades and band saw blades. W. O. Barnes Co., Inc., 1297 Terminal Ave., Detroit 14.
- 5. Collets, Pushers, Feed Fingers, Pads for all types of screw machines, as well as lathe collets, are listed in Catalog 56. Copies may be obtained from Balas Collet Mfg. Co., Dept. C-5, Cleveland 14, O.
- 6. Friction Sawing of sheet steel, formed or flat; non-ferrous metals, formed or flat; armor plate; soft or hardened steels; plastics; glass and other materials is covered in booklet by Arthur A. Schwartz, Bell Aircraft Corp. Available from The Tannewitz Wks., Grand Rapids 2, Mich.
- 7. Power Tools for the cutting, shaping, drilling and finishing of wood, metal and plastics are presented in Catalog No. 57. Several new tools are described. Boice-Crane Co., 936 W. Central Ave., Toledo 6, O.
- 8. Chromium-Nickel-Manganese Stainless Steels Types 202, 204, and 204L are the subject of an eight-page data sheet which gives detailed information on intergranular corrosion, mechanical properties, analysis, stress rupture properties. Adv. Dept., Allegheny Ludlum Steel Corp., 2020 Oliver Bidg., Pittsburgh 22. Pa.
- Four-Way Air Valves, available as single solenoid or for foot or cam operation, are presented in catalog with price list. Single solenoid valves use air-return principle, no springs. A. K. Allen Co., 57 Meserole Ave., Brooklyn 22, N.Y.

To receive copies of literature described on these pages, simply encircle corresponding numbers on handy postage-free Action Cards opposite page 64 and elsewhere in this issue.

Free Literature

continued

- 10. Standard Designations. Revision of the list of standard designations and chemical composition ranges for heat and corrosion resistant cast alloys has been issued by the Alloy Casting Inst., Mineola, N.Y.
- 11. Tap Drivers. Three types of Safe-Torque tap drivers, designed to increase tap life and production, are described in Bulletin 20-50, Scully-Jones and Co., 1901 S. Rockwell St., Chicago 8, Ill.
- 12. Power Transmission Equipment is presented in pamphlet covering steel shaft hangers, hanger bearings, split journal bearings. Standard Pressed Steel Co., Box 606, Jenkintown, Pa.
- 13. Grinding Wheel Adapters for wheels from ½" to 2" in width, with both l.h. and r.h. threads, may be used on 25 makes of grinders. Catalog from Wm. Sopko & Sons Co., 140 E. 267th St., Euclid, O.
- 14. Stub Arber adaptable to many different size milling cutters is presented in leaflet. With a side-milling cutter, arbor does any shaper jobs fast and to close tolerances. Sierra Machine Co., 80 E. Jackson Blvd., Chicago 4, Ill.
- 15. National Trade Associations. More than 2000 trade associations and related national organizations of businessmen are

- listed in the "Directory of National Trade Associations." Supt. of Documents, U.S. Govt. Printing Office, Washington 25, D.C.
- 16. Machine Knives, Edge Tools, tool steel specialties are presented in this catalog. Rockwell hardness, tool steel for maximum abrasion resistance are discussed. Alcon Production Tool Co., 579 Baird St., Akron 11. O.
- 17. Threading Heads. Bulletin F-90-3 includes detailed information on heat-treated die heads, both standard and special. Complete specifications and illustrations of each die head. Landis Machine Co., Waynesboro, Pa.
- 18. Steel Data book gives helpful information on machining and fabricating, specifications and tolerances, weights and dimensions, elements and safe loads, Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill.
- 19. Screw Threads. Revised edition of "Unified and American External Screw Threads" contains general information for both straight, external, and internal threads. Price 75 cents. Reed Rolled Thread Die Co., Worcester 1, Mass.
- 20. Air Motor Inclining Device, available as optional equipment on Series E. A., and AA open-back inclinable presses (45 to 200 ton models) are introduced in bulletin supplement. Niagara Machine & Tool Wks., 683 Northland Ave., Buffalo 11, N.Y.



(See Number 12.)



(See Number 13.)



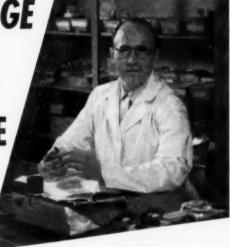
(See Number 17.)

The BEST JUDGE

of an

INDICATOR'S PERFORMANCE

is the Man who Services it!





... costs LESS
does more longer!

Ask the man who repairs your dial indicators why he favors Standard. He'll tell you Standard not only requires far less attention than other makes, but that it's the easiest of all to service. Reasons for this not-to-be-matched ease and economy of maintenance stem from Standard's greater simplicity of design . . . unequalled workmanship . . . exceptionally rugged construction . . . and a 100% shockproof mechanism. Better check your indicator cost today; then talk to the Man from Standard.

Shockproof mechanism keeps (Grands) on-the-job...
Cuts service time and cost!



Gage Company, Inc.

8 S I N C E 1 9 2 5 165 Parker Avenue • Poughkeepsie, New York

A COMPLETE LINE OF GAGES

INDICATING, FIXED AND ADJUSTABLE LIMIT TYPES

Free Literature

continued

- Engineering Data. Reecemelt booklet features an explanation of combinations in engineering properties of grey iron. Herbert A. Reece and Assoc., Union Commerce Bldg., Cleveland 14, O.
- 22. Plate Shear. Eight-page catalog describes hydraulic plate shear. Includes complete data on controls, construction, and dimensions. Ask for Catalog No. 305. Pacific Industrial Mfg. Co., 848 Fortyninth Ave., Oakland 1, Calif.
- 23. Die Sets, Accessories. Catalog No. 11 introduces many new items: rectangular progressive rear pin die sets; watchmaker die sets; die sets for Multi-Slide, Fourslide and dieing machines, etc. Producto Machine Co., 990 Housatonic Ave., Bridgeport I. Conn.
- 24. Brushes, Brushing Machines. New 100-page, completely illustrated catalog, "Brushes for Industry," contains information on how to select and use power brushes, Brushamatic machines, paint and varnish brushes, and maintenance brushes. Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
- 25. Gear Shaving Cutters. Reference manual deals with the care and use of gear shaving cutters. Included are cutter specification tables; mounting instructions; data on speeds, feeds, coolants, etc. National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

- 26. "Lubricants for Stamping and Deep Drawing," Bulletin No. 138, describes properties of press drawing lubricants: appearance, composition, recommendations, dilution, Magnus Chemical Co., Inc., Garwood, N.J.
- 27. Grinder Applications. Difficult and unusual surface grinding applications performed by leading metalworkers are graphically described in "Case Histories." Mattison Machine Wks., 545 Blackhawk Pk. Ave., Rockford, Ill.
- 28. Lathe Accessories. Bulletin R describes accessories for jeweler's lathes. Turret tools include releasing tap and die holders with shock-free clutches. Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, Calif.
- 29. Industrial Heating Equipment. Folder covers large production furnaces for all forms of metal heat treating, continuous enameling, aluminum melting, ceramic requirements. Lindberg Industrial Corp., 2321 W. Hubbard St., Chicago 12, Ill.
- 30. Laminated Shims. Catalog contains technical data for laminated shims of brass, mild steel, stainless steel, aluminum. Laminated Shim Co., Inc., Glenbrook, Conn.
- 31. Concentric Grinder. Catalog tells of a shoe-type centerless grinding method for ring-shaped parts with either straight or profiled shapes. The 4" concentric grinder does automatic grinding of small parts economically. Landis Tool Co., Waynesboro, Pa.



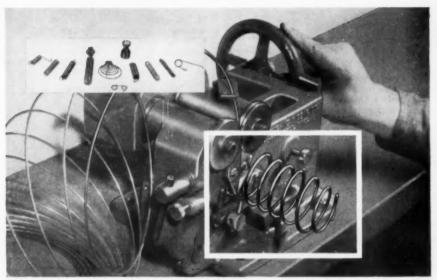
(See Number 22.)



(See Number 24.)



(See Number 26.)



Make any type spring . . . fast, exact!

For a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005" to .125", you can produce it in a matter of seconds with Perkins Precision Spring Coiler. You eliminate arbors, yet turn out precision springs — torsion, compression, extension, tapered, or special springs, coiled either left or right hand, in any desired length, any diameter from 3/32" to 12" and larger, with or without initial tension, and with

open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications as replacements or experimental work. Make them fast, right in your own shop!





Starret adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.

SIF	Perkins Machine and Gear Co. Pecial Machinery Division, Dept. A1 V. Springfield, Mass. Please send information and prices on Perkins Spring Coiler. Pland Model Power Model
1	NameTitle
(Company
1	Address
(CityState

Free Literature

continued

- 32. Bench-Medel Comparator. Literature illustrates comparator, gives range and accessories available. Comparator quickly and accurately checks pitch diameter on splines and gears—externally or internally; lengths of parts; shoulder distances; center to center; o.d. and i.d. dimensions. Jerpbak-Bayless Co., Solon Rd., Solon, O.
- 33. Optical Analysis of gears and splines—fine pitch involutes—is described in Form 5448. Single master chart is used to inspect a wide range of sizes of gears and other involute forms. With this chart a complete analysis of the form can be made. Jones & Lamson Machine Co., Springfield, Vt.
- 34. Carbide Tool Grinders. Catalog No. 260 illustrates and describes complete line of carbide tool and chip breaker grinders. New machines are the SCE-6, CBW-6, CM-6W, CM-6, and 14-SWD. Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Mich.
- 35. Diamond Abrasives. "The Technology of Precision Lapping" illustrates and describes the use of fine diamond abrasives in precision lapping and microfinishing. Penn Scientific Products Co., 1000 Old York Rd., Abington, Pa.

- 36. Single-Pass Tap. Features of the Romine single-pass Acme tap, stock sizes from \%" to 2\%" dia., are detailed in illustrated catalog available from the manufacturer, Horspool & Romine Mfg. Co., Inc., 5850 Marshall St., Oakland 8, Calif.
- 37. Mechanical Force Gages are described in Bulletin 750c. Gives complete specifications for each of the manufacturer's 18 precision direct-reading gages, which can be used for measuring both tension and compression loads up to a maximum of 200 lb. Hunter Spring Co., 1 Spring Ave., Lansdale, Pa.
- 38. Alignment Testing. Pamphlet on alignment testing discusses measuring instruments, optical methods, practical applications, Auto-Collimator, block level. Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.
- 39. Milling Spindles. Bulletin C15 covers milling spindles for milling, boring, routing, drilling. Motorized; sizes up to 200 hp. Infinitely variable speed. Standard Electrical Tool Co., 2488 River Rd., Cincinnati 4, O.
- 40. Drilling Attachments. Engineered to produce holes deep, straight, fast, with maximum concentricity and minimum drill breakage, the Tru-Hole "Speedy" drilling attachments for large and small lathes are presented in folder from E. F. Vilter Co., 4161 N. Richards St., Milwaukee 12, Wis.



(See Number 34.)



(See Number 36.)



(See Number 37.)



DRILL MICRO-HOLES

DOWN TO .0016" with SPEED & ACCURACY

and accessories. ON ZEVIN ® INSTRUMENT LATHES

LOUIS LEVIN & SON, INC.-3610 S. BROADWAY-LOS ANGELES 7, CALIFORNIA

mercial drills can be had as small as .0016" this micro-drilling apparatus has successfully produced "oloes as small as .0006" Send for Catalog M describing complete line of instrument lathes

Free Literature

continued

- 41. Cold Headed Fasteners. New four-page catalog covers the design and manufacturing advantages of cold headed fasteners and parts. Text and illustrations show the infinite design possibilities in rivet, nail and threaded part manufacture by the cold heading or cold forging process. John Hassall, Inc., Westbury, Long Island, N.Y.
- 42. Floating Holder. Specification sheet describes floating tap and reamer holder with fast-change collets which are provided with a set screw in end for presetting. Seibert & Sons, Inc., Chenoa, Ill.
- 43. Wet Blasting Process. A series of illustrated folders describe a variety of applications for the Pressure Blast wet blasting process. Cro-Plate Co., Inc., 747 Windsor St., Hartford, Conn.
- 44. Industrial Power Presses. Catalog describes company's line of standard, high production power percussion presses. Detailed specifications, capabilities and capacities in tabular form for easy reference. Zeh and Hahnemann Co., 186-2 Vanderpool St., Newark 5, N.J.
- 45. "Automatic Welder Uses Air Power for Twenty-two Different Operations" is title of article contained in Vol. 2, No. 1, "Ross Enginair." Ross Operating Valve Co., 120 East Golden Gate Ave., Detroit 3, Mich.

- 46. Hydraulic Press. Bulletin No. 371 describes design features and specifications of hydraulic general purpose press. For short production runs. Watson-Stillman Press Div., Farrel-Birmingham Co., Inc., 300 Aldene Rd., Roselle, N.J.
- 47. Forged T and T Slot Bolts are described in detail in four-page booklet. Extra long bearing surface withstands tight wrenching without damage to table slots. Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland 10. O.
- 48. Barrel Finishing Equipment. This 20page general catalog of barrel finishing equipment and supplies includes information on all types of abrasive and burnishing media, and necessary compounds. Globe Div., Casalbi Co., Box 411, Jackson, Mich.
- 49. Adjustable Draw Plates. Catalog No. TH56 contains basic technical information, principles of operation and advantages of Turks Heads and explains typical wire shaping applications. Fenn Mfg. Co., Fenn Rd., Newington, Conn.

To receive copies of literature described on these pages, simply encircle corresponding numbers on handy postage-free Action Cards opposite page 64 and elsewhere in this issue.



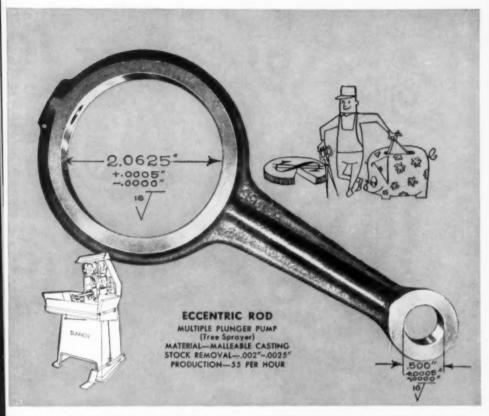
(See Number 41.)



(See Number 45.)



See Number 46)



A COST-CUTTING PROCESS FOR ACCURATE BORE PRODUCTION

Tolerances are getting closer and closer! That's why producing bores to specifications (size and finish) with standard machine tools is becoming a tough job.

Many plants—large and small—have found the answer is Sunnen-Sizing. Holes are produced slightly undersize on the preceding operation...then, Sunnen Honing is used as the standard bore-finishing operation.

This process speeds production because you can open up tolerances on ... reaming, boring or grinding. You can increase speeds and feeds. Your tools last longer. Less time is lost sharpening, dressing and resetting tools.

Overall production is increased, all parts come within specifications...no undersize rejects—no oversize scrap.



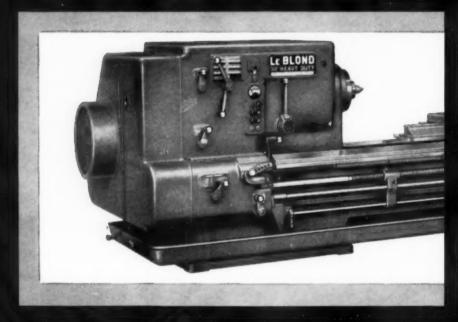


CHECK READER SERVICE CARD



E FACTS ON SUNNEN HONING

LeBlond 25" Heavy Duty Lathes LeBlond 32" Heavy Duty Lathes (shown)



for today's toughest

rigidity

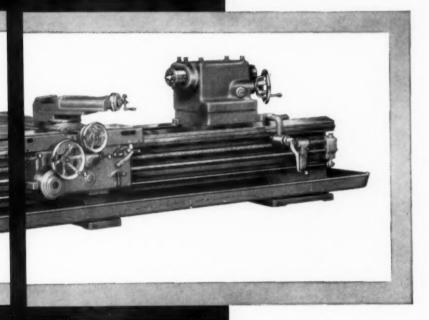
convenience

50 hp on the 25", 60 hp on the 32". Here's proof of efficiency—maximum no-load friction hp on the 32" is only 3.4 hp @ 500 rpm.

High-capacity 4-bearing spindle. One-piece double-wall apron. Heavy, short shafts; hardened and ground gears. Hardened and ground compensating steel bed ways.

4-directional power rapid traverse, controlled with a single lever. Direct-reading, color-keyed speed change levers. Single-lever feed control.

Adjustable torque to bring heavy work pieces up to speed safely. Similar adjustments for stopping and jogging.



turning

... cut with confidence



THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI 8, Q.

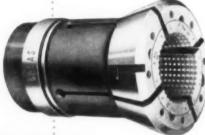
World's Largest Builder of A Complete Line of Lathes for More than 70 Years this little ring can save you hundreds of dollars a year.

if it's in a

BALAS COLLET



Balas "CB" Collet



Balas "CT" Collet



Martin Master Collet

You can avoid "down time" by using Balas Collets with neoprene "O" Ring Seals. Experience proves that machines will run many months without withdrawing the collet tubes for cleaning when they are equipped with Balas "O" Ring Seal Collets...and best of all there's no extra charge for this extra feature!

Buy Balas Master Collets and assorted sets of collet pads so you can make full use of your machines. You save money because a set of pads is only about a third of the cost of a solid collet and "change over" time is shortened by hours.

Balas Solid and Master Collets are stocked in most sizes for all popular makes of automatics. With all their extra advantages they cost no more than ordinary collets! Save valuable time, material and money by standardizing on Balas for all your machines!

BALAS COLLET MANUFACTURING CO.

Cleveland 14, Ohio

Circle No. 2-D on Cord



High-speed, vane-type grinder, Mini-Grinder, is not much larger than a fountain pen. Rated capacity is 1/2" mounted point or grinding wheel; tool has 1/8" precision-ground collet. A rotary valve in the all-steel tool provides infinite speed control from 0 to 50,000 rpm. Ball bearing motor mounts assure spindle precision. Buckeye Tools Corp., Div. 22, P.O. Box 966, Dayton 1, O.

Use postpaid card. Circle No. 81



MOTO-TOOLS

in your shop!

Dremel Moto-Tools pay for themselves OVER and OVER in your toolroom and on your production line. High-speed precision tools. Real time savers for polishing, grinding, sharpening and de-burring operations.

Weighs only 13 oz., develops 27,000 R.P.M.

Mato-Tool No. 2 with one emery wheel point\$17.85 Mete-Tool Kit No. 2 with 23 assorted accessories including high-speed steel cutters and Model 2 Moto-Tool in sturdy steel case

INDUSTRY'S PORTABLE MACHINE SHOP FROM TOOL-ROOM TO PRODUCTION LINE



SHARPENING



DE-BURRING





See your industrial distributor or write for Dremel Catalog.

DREMEL MANUFACTURING CO., Dept. 217-B, Racine, Wis.

Use postpaid card. Circle No. 331

MASTER RADIAL



MASTER RADIAL



TURRET LATHES
No. 3, 4, 5—1AP, 2AP,
3AP, 4AP
Ram & Saddle—Tracer
& Auto Cycle Avail.



SUPER BORING
MILLS
Table Type—2" to 5"
Floor Type—5" to 12"
Avail. w/dbl. spdis.—
Electro-mag clutches



TOOL & ENGINE ROOM LATHES 10" x 30" to 18' x 100'

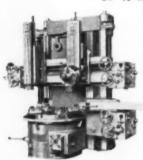
NEW MACHINE TOOLSFor Immediate Delivery

FOR SALE OR RENT— TERMS UP TO 10 YEARS

THOUSANDS OF OUR CUSTOMERS HAVE SOLVED THEIR REPLACEMENT PROBLEMS BY CHECK-ING S & S'S NEW EQUIPMENT DIVISION.

Over 50,000 Of These Tools In Use

VERTICAL TURRET LATHES 24" to 120"



HORIZONTAL BORING MILLS 5" and 6" Spindles



Write Dept. N-1



145 53rd St. Brooklyn 32, N.Y.
Phone: HYacinth 2-7400; Cable: Sandstools



OERLIKON VERTICAL
MILLING MACHINE
World Famous Machine
Teol Builder



DP6
HIGH POWER &
DUAL POWER
Plain, Vertical and
Plain Vertical



SUPERMILL DIAL TYPE 121/4"x80" Table, 10 HP.



BAND SAW & FILING MACHINES 16" to 72" Threat



SUPER GRINDERS 3" x 12" to 18" x 120"



20" x

METAL CUTTING MACHINE



EXTRA CAPACITY AT LESS COST

The Racine 20 x 20 has a two inch greater capacity at a 31 to 37% investment saving.

Rugged, simple construction with complete, modern hydraulic controls.

A single lever controls all operations.

All parts are easily accessible.

Dual 100% progressive metered Positive and flexible feed

Write for catalog and prices of complete RACINE line, including single purpose, special and fully automatic models, capacities from 6" x 6" to 20" x 20".



RACINE HYDRAULICS & MACHINERY, INC.

2054 Albert St., Racine, Wisconsin

Saves 40% Space!

STRONGER, TOO



NEW LITERATURE . . . send today for new Bulletin with complete details of Spacemaker line.

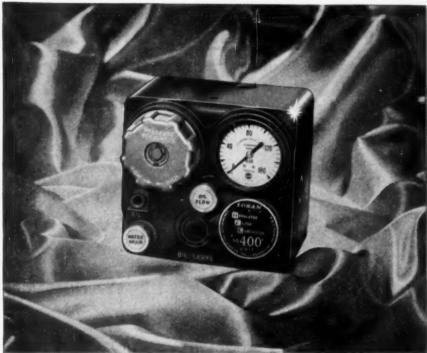
• NEW exclusive Ingenious Cushion Designs . . . Super Cushion

- Compact design eliminates tie rods, saves up to 40% space
- Proven Performance . . . with Extra High Safety Factor
- · Hard Chrome Plated Bodies and Piston Rods (Standard, at no

You'll find many answers to automation in your plant with T-J Spacemaker Cylinders' Designed with years-ahead features for top performance and dependability. Wide range of styles, capacities . . . for all kinds of push-pull-lift operations . . , reduces man-hours and costs! Write The Tomkins-Johnson Co., Jackson, Mich.

MEMBER OF THE NATIONAL PLUID POWER ASSOCIATION

OMKINS-JOHNSON



Illustrated-Logan Model 400 RFL Unit

Look to Logan

Logan RFL Unit, the designers choice for over a decadel Protects your air-powered equipment . . regulates pressure . . filters air . . lubricates air. Adds years of dependable performance.

New Model 400, illustrated above, is a companion model to the well-known Model 600.



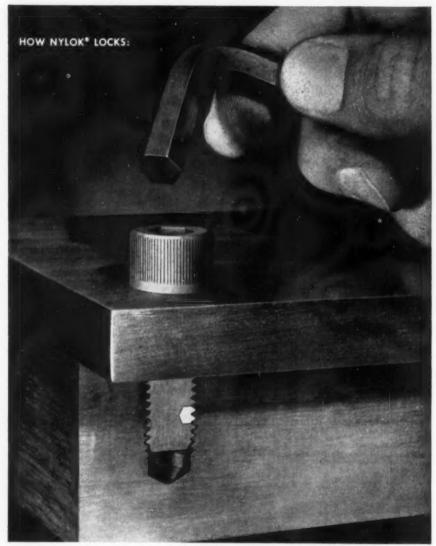
FREE SEND FOR THE "LOGAN CALCULATOR"

MEMBER: Natt Mach Tool Builders' Assn.; Natt. Fluid Power Assn.

	ACHINE CO., INC.				
BOI CENTER AVENUE.	LOGANSPORT, INDIANA				
PLEASE SEND COPY OF CATA	LOG:				
100-1 AIR CYLINDERS	☐ 62 SURE-FLOW PUMPS				
100-2 MILL-TYPE AIR CYLS.	1 200-1 HYD. POWER UNITS				
100-3 AIR-DRAULIC CYLS.	200-2 ROTOCAST HYD.				
100-5 LOGANSQUARE	200-1 750 SERIES HYD.				
100-5-1 ULTRAMATION CYLINDERS	200-4 and 200-7 HYD. VALVES				
T SI PRESSES	70.1 CHUCKS				
FACTS OF LIFE	ARC EGOKLET				
□ Cit	CUIT RIDER				
TO:					
NAME	TITLE				
COMPANY					
ADDRESS					

the ultimate in air čircuit accessories

NEW-self-locking UNBRAKO



LOCKED! The tough, resilient nylon pellet keys itself into the mating threads. It forces threads together and locks the screw securely.

socket head cap screws

They won't work loose. And they simplify design and save production time.



Self-Locking UNBRAKO socket head cap screw.



BEFORE ASSEMBLY. The nylon pellet projects slightly. When assembled, threads will be impressed into it.



AFTER REMOVAL. "Plastic memory" of pellet has expanded impressed threads to greater diameter than screw threads. Screw can be used repeatedly. In use, "memory" keeps threads tightly locked.

UNBRAKO socket head cap screws are now available embodying the Nylok* self-locking principle. Nylok provides the first truly practical solution to the problem of making cap screws self-locking.

An Unbrako cap screw with Nylok is a single self-locking unit. No auxiliary locking devices are needed. Just thread the Unbrako into any tapped hole. Seated or not, it locks positively wherever wrenching stops. The tough, resilient nylon pellet forces mating threads together and holds tight. The screw will not work loose.

You save production time when you make products with self-locking Unbrakos. And you get greater simplicity in design with less bulk and weight. The number of parts you must assemble to achieve full locking action is reduced to the absolute minimum. Lockwashers under screw heads are no longer necessary. Costly wiring of cross drilled heads is eliminated. And in many cases you will save weight and mass by using shorter screws in tapped holes instead of drilling through and using nuts and lockwashers.

Self-locking Unbrakos are reusable. They have uniform locking and installation torques—with no galling or seizing on mating threads. They successfully withstand temperatures from -70° to 250°F. And, when screws are properly seated, the locking pellet also functions as a liquid seal.

A complete line of self-locking Unbrako socket screw products, in a wide range of standard sizes, materials and finishes, is available through your authorized industrial distributor. Technical data and specifications are detailed in Bulletin 2193. Write us for your copy today. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 52, Pa.

*T.M. Reg. U.S. Pat. Off. The Nylok Corporation

UNBRAKO SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.



Use postpaid card. Circle No. 336



Hydraulic tube bending press

Model 6-T vertical ram-type tube bending press is capable of making two bends in each of two or more tubes, and able to bend two different angles in the same "U" frame. Self-contained hydraulic system is built for continuous



production. Press has a rated capacity of six tons and is designed so that the full ram tonnage is available for the bending action. This is possible because the center clamp moves with the ram and the cushion pressure does not oppose the ram tonnage.

Other features include twin equalizing cushion cylinders, variable speeds, single adjustment for wing dies, retracting ram dies, and changeable wedge inserts for ram dies. Press may be used for bending both steel or non-ferrous tubing. It has adequate power and capacity for continuous bending of 1" o.d. steel tubing. Provisions have been made for accurately aligning dies, and the wing die moves with the tube as it is wrapped around the ram die, eliminating the possibility of draw marks on the tube.

Pines Engineering Co., Inc., Dept. HS, Aurora, Ill.

Use postpaid card. Circle No. 82

The WALTON Company

HARTFORD 10, CONN.

Walton Specialized

BRASS

keeps sales up...

TURNER IS A LONG-TIME USER OF ANACONDA BRASS ROD AND TUBE— GIVES 10 REASONS WHY—

Blow torches built by The Turner Brass Works, Sycamore, Ill., have a reputation for dependable operation and long life. Since 1871, brass has been used consistently in their construction and has built a quality reputation for Turner Turner prefers Anaconda Brass as a quality metal and looks to The American Brass Company as a quality source of supply.

These are the reasons given:

- Brass is the quality material needed for the service.
- Brass is easily machined at high speed, with less tool breakage manufacturing costs are 15% lower than with other metals.
- 3 Close tolerances are easily held with brass.
- Threading holds well yet accessories are easily screwed on and off
- Brass takes a good finish polishing is easy and economical.
- Clean, polished brass products have proven high sales appeal.
- Brass stands up under alternate heating and cooling.
- Brass resists corrosion the torches are used on land and sea, throughout the world.
- Brass gives superior wear on valve seats.
- Brass has high public acceptance as a quality material.

Turner liquelied petroleum torch No. LP-555, with disposable fuel tank. Below are accessories of brass-holder for soldering tip and a heavy-duty burner.





The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

ANACONDA

COPPER · BRASS · BRONZE

Use postpaid card. Circle No. 338

SETTING

PRODUCTION RECORDS

for large hole tapping!

"TAP KING"

You'll marvel at the speed, power and precision at your finger tips when you operate this remarkable tapping unit. Designed specifically for large hole tapping, in heavy materials, it has repeatedly demonstrated its superiority on many difficult jobs. Here are just a few samples of the kind of work you can expect with the Tap King: "on open hole tapping in carbon steel forgings—production increased 50%"—"on blind tapping in steel castings—production up 100%"—"tapping in 11/2" steel plate—a class 2 fit was maintained with ease." The Tap King assures you better finished parts, less spoilage, fewer broken taps, faster, easier operation and greater production. Discover how far you can go in improving your tapping operations and reducing costs.



Write for FREE brochure

giving you full details and specifications on this amazing unit.

	PROCUNIER			SAFETY		HUCK	CO.	
14.	5.	Clinton	St.,	Dept.	2,	Chica	go 6	, 111
-								

Please send your Free Illustrated Brochure

Name

City...... Zone...... State......

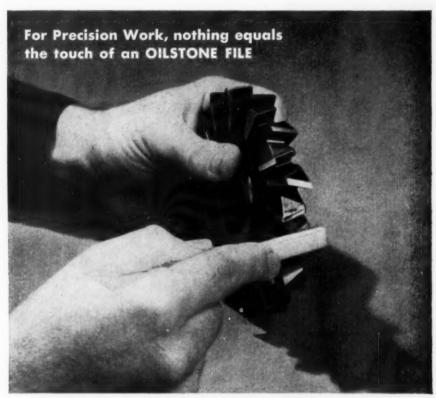
NEW heavy duty "TAP KING"

EXCLUSIVE

tru-grip tap holder smaller, lighter, permits tapping close to walls and shoulders

PROCUNIER Safety Chuck Company

14 S. Clinton Street . Chicago 6, Illinois



Hand stoning cutting tools pay off in better cutting speed and longer tool life. Millers, lathe bits, drills and other cutting tools all can be made to give superior performance with an INDIA (for regular work) or HARD ARKANSAS (for superfine finishes) oilstone file.

Over 35 different shapes and 97 sizes are available to help you reach just about any surface that needs sharpening, deburring, etc. The Hand Stoning Handbook gives full details. Write for your free copy today. Address Behr-Manning Co., Troy, N. Y. Dept. MT-2.



BEHR-MANNING CO.

A DIVISION OF NORTON COMPANY NORTON



BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-Cat Tapes NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories.

Use postpaid card. Circle No. 340

February, 1957

203

Which boring head will do your job?

CRITERION makes a wide range — 1½ to 7 inches in diameter. Bore accurate holes ½ to 20 inches.

CRITERION Heads feature widely spaced graduations — Easy reading — Accurate adjustment — Rugged construction — Dependable operation, Built for long life and chatter-free performance.



Ground shanks and adapters for all popular machine tools



Select your

Select your boring head for ROUND or SQUARE shank tools.

DIVERSIFIED OPERATION

Check the application of these tools on Turrets or Automatic Lathes.

MAXIMUM OFFSET TRAVEL Save time—Money—Elim-

inate excessive tool change.

CRITERION MACHINE WORKS
765 WEST SIXTEENTH STREET
COSTA MESA, CALIFORNIA

Consult your dealer or write for free catalog.

BORING TOOLS
Boring, grooving and
Internal threading
tools are stocked in
High Speed or Carbide.

Install it ... then Forget it!

THE NORMA-HOFFMANN "CARTRIDGE" BEARING

Needs No Attention

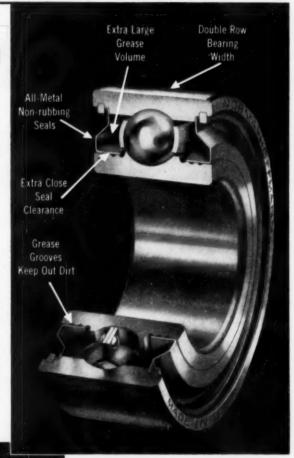
"Cartridge" ball bearings installed more than 15 years are still running without relubrication.

HERE'S WHY:

"Cartridge" double row width bearings are complete units — ready for installation.

"Cartridge" bearings are adequately lubricated with correct amount and the right kind of grease.

"Cartridge" bearings are fully protected — with highly efficient all-metal, non-rubbing lifetime seals.



NORMA-HOFFMANN
Precision BEARINGS

NORMA-HOFFMANN BEARINGS CORPORATION Stamford, Connecticut Founded in 1911

FIELD OFFICES: Atlanta, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detreit, Kansas City, Los Angeles, San Francisco, Seattle



Knu-Vise offers rugged heavy-duty clamps, with solid bar or channel bar, and either hand or air operated, for all kinds of tough holding jobs.

In addition to their stand-up stamina for rough going, these Knu-Vise Clamps feature:

- 1-Easy and complete replaceability of parts
- 2-Hardened and ground bearing bolts
- 3-Minute adjustment of parts through self-locking nuts
- 4-Toggle Bars from C.R.S. Bars

Developments like these are typical of Lapeer engineering. More information? Write for catalog today on the models available.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS

LAPEER MANUFACTURING CO.

3052 DAVISON ROAD

LAPEER, MICHIGAN

WESTERN DIV.: 422 Magnolia, Glendale, California . CANADIAN DIV.: Higginson Engr., Hamilton, Ontarle

Use postpaid card. Circle No. 343

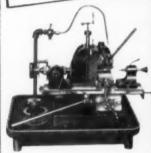
206

MACHINE and TOOL BLUE BOOK

Derbyshire fine precision equipment



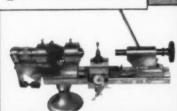
MODEL No. 750 BED 22" CENTER HINDHT - 7.80 CM COLLET EAPACITY - .318"



BACK LATHE - IN SER

CENTER INDIGHT - 2.33" (A CA)
AICROMILL CHUCK CAPACITY - .504" (> .3
TABLE SURFACEL

1" x 256"
TAXES,
AAGRES
AAGRES



MAGNUS LATHE - 12" BED CENTER HEIGHT - 8 CM COLLET CAPACITY - 315"



F. W. DERBYSHIRE, INC.

WALTHAM

MASS.

Write for full details



NEWS OF THE INDUSTRY

MACHINE AND TOOL

blue book

Materials Handling Show Set for Philadelphia, April 29-May 3

The seventh national materials handling exposition will be held at Convention Hall, Philadelphia, April 29 through May 3. The last show was held in Chicago two years ago.

Concurrently with the show, the American Material Handling Society will conduct a conference to discuss new developments in handling methods. The society also will hold its annual banquet during the show period and will present its annual honors and awards at that time.

Theme for the 1957 show will be "Materials Handling, Key to Automation." More than 180 companies already have reserved space for exhibits; the total is expected to exceed 250. Registration cards may be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N.Y.

Ex-Cell-O of Canada Triples Plant Size

Ex-Cell-O of Canada marked its third anniversary in December of last year. Manufacturing space has tripled, to nearly 60,000 square feet, since the beginning of operations in 1953. This expansion, plus 13,000 square feet in a recently completed engineering and administration addition, and 27,000 square feet in a new assembly shop

under construction, will soon provide the company with working space totaling 100,000 square feet.

Personnel has likewise been increased to handle expanding production. In December of 1953, the work force numbered but 80 people; there are now 400 employees.





NTDMA WINS NSC SAFETY AWARD—Herbert Harig (right), newly-elected president of the National Tool & Die Manufacturers Association, accepts award for promotion of safety in small business on behalf of the association. Presenting the plaque during the recent National Safety Congress in Chicago is David L. Arm, manager of the industrial department of the National Safety Council.



SOUNDS OPTIMISTIC NOTE—The machine tool industry, which has grown twice as fast as the nation's total economy in the past five years, is headed for new plateaus of prosperity if the nation keeps its fiscal and economic house in order, Louis Polk, chairman and president of the Sheffield Corp., Dayton, O., told the 55th annual meeting of the National Machine Tool Builders' Association in his keynote address as president of the Association.



WEDIN LEAD SCREWS

We grind threads up to eighteen inches in diameter thafts, screws or parts less than six feet long. We also grind any thread form and thread diameter up to three inches on shafts longer than six feet.

LEAD SCREWS . FEED SCREWS . ELEVATING SCREWS

Send us your print for quotation, any quantity from

they're

GROUND

LONGER

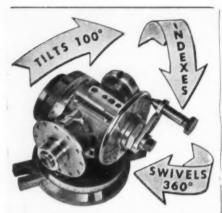
Complete facilities for

DEEP-HOLE DRILLING



840 East Lewiston, Ferndale, Michigan

SERVING INDUSTRY



FOR FASTER PRODUCTION

THE ELLIS

DIVIDING HEAD

Although it is built to fine instrument standards, the ELLIS is a really rugged tool room or production tool that's designed for unusual versatility. Its universal motions — swiveling in two planes — will save time and increase profits and accuracy on your millers, grinders, drill presses and jig borers. It has 6½" swing, or 11" swing when used with riser blocks. Work may be held between centers, or in chucks or collets. To save rehandling of work, and to save money, investigate the ELLIS by writing for complete details!



76-G MAMARONECK AVE. WHITE PLAINS, N. Y.

Prindiville made chairman medical education committee

John J. Prindiville, Jr., president and treasurer of The Lapointe Machine Tool Co., has accepted the chairmanship of the Machine Tool Builders Committee of American Industry of the National Fund for Medical Education Alfred V. Bodine,



J. J. Prindiville, Jr.

Medical Education. Prindiville succeeds Alfred V. Bodine, who was chairman of the committee for the past several years.

A division of the National Fund for Medical Education, the Committee of American Industry is spearheading a nationwide appeal to raise \$10,000,000 for the country's 82 medical schools. Mounting deficits are threatening not only the school's teaching and research programs but also their high academic standards.

Working with Prindiville are: George E. Bass, president, Ferracute Machine Co.; H. Glenn Bixby, president, Ex-Cell-O Corp., A. V. Bodine, president, The Bodine Corp.; Edward C. Bullard, president, The Bullard Co.; Robert M. Gaylord, Jr., Ingersoll Milling Machine Co.; Milton P. Higgins, president, Norton Co.; Ralph S. Howe, president, The New Britain Machine Co.: Louis Polk. president, The Sheffield Corp.; Henry D. Sharpe, Jr., president, Brown & Sharpe Mfg. Co.; Norman F. Smith, president, Osborn Mfg. Co.: Charles J. Stilwell, chairman, Warner & Swasey Co.; Herbert L. Tigges, executive vice president, Baker Brothers Inc.

Detroit office moves

The Landis Machine Co., Waynesboro, Pa., has moved its Detroit Office to 12806 Fenkell Ave., Detroit 27, Mich.



Norgren

for design engineers **ANNOUNCES**

and
PLANT
ENGINEERS

Important New Developments in Compressed Air Filters and Pressure Regulators



NEW Norgren Air Line Filters

- LESS PRESSURE DROP larger passages and larger filter element,
- BETTER LIQUID REMOVAL Improved lower plate and baffle design. Removes
 more liquid from the compressed air line.
- . CHOICE OF FILTER ELEMENT-interchangeable filter elements, 74, 64, or 25 micron,

NEW Norgren Pressure Regulators • GREATER ACCURACY OF REGULATED PRESSURE – bolanced vo

- GREATER ACCURACY OF REGULATED PRESSURE balanced valve and increased effective diaphragm area provide improved accuracy over a wide operating range.
- . RELIEVING OR NON-RELIEVING TYPE AVAILABLE
- IMPROVED RELIEVING CHARACTERISTICS automatic relief of excess pressure.
 Holds system pressure close to regulator setting.

For complete information...
call your nearby Norgren Representative listed in your telephone directory—or
WRITE THE FACTORY FOR NEW CATALOG.

C. A. NORGREN CO.

3438 SOUTH ELATI STREET . ENGLEWOOD, COLORADO



Quartz, the hardest mineral found is present in Herman Ganite in just the right proportions to profide a smooth abrasion-free working surface. This quartz in pure crystal form can be seen easy in Herman Pink Surface Plates

*Registered Accuracy

Inspection is with Auto-Collimator used in controlled atmosphere. All tolerance is above datum plane for extra accuracy. A plotted graph signed by Herman inspectors shows accuracy is within your specified limits and plate is registered by serial number at our factory.

write for descriptive folder.



Use postpaid card. Circle No. 349

U. S. Steel buys Hegewisch plant

United States Steel Corporation's supply division is purchasing the Chicago Hegewisch ordnance division plant of U.S. Industries, Inc., which has been processing tanks and armored vehicles since 1951. Under terms of the sale. USI will occupy such facilities as necessary to complete its present government contracts.

The plant is situated on a 154-acre plot on the Grand Calumet river. The supply division plans gradually to concentrate its Chicago warehousing operations at the new location. Its principal buildings, occupying about 1,200,000 sq. ft., will more than double the present Chicago warehouse area.

Carborundum to build in Ohio

The Carborundum Co. plans to build a new multi-million dollar plant in Van Wert, O. for the manufacture of small abrasive wheels. The new plant is part of Carborundum's \$30,000,000 modernization and expansion program scheduled for 1957 and '58.

Provision will be made for many automatic processes, with orderly flow of materials from abrasive mix, through molding, firing, finishing, testing, and shipping. The single ground floor structure will be 440 ft. x 160 ft., with one side extension for a battery of kilns and another extension for offices, and will encompass a total of 91,000 sq. ft. of floor space.

FREE REPRINTS

The following reprints are available from MACHINE & TOOL BLUE BOOK, 222 E. Willow Ave., Wheaton. Ill. Send for your free copy today

1. Flexible Reinforced Wheels by Richard C. Bush.

How Douglas Solved Its Deep Hole Drilling Problems by A. R. Felando.

a MIGHTY fine press...

built to withstand rigorous service

From crown to base. Minster SI's are truly MIGHTY presses. You get these features as Standard Construction.

- Box type cost construction for maximum rigidity.
- All wear surfaces bronze lined;
 precision fitted and replaceable
- Minster patented Combination Multiple Disc Air Friction Clutch and Brake
- Exceptional Slide guiding and barrel type adjustment
- . Air Counterbalances on slide
- Totally enclosed gears running in oil
- . J. I. C. Dimensions

capacities from 50 . to 600 tons MINSTER
series \$1
straight side single point
presses

for drawing, forming, trimming or blanking.

MINSTER

Photo courtesy of Long Manufacturing Division, Barg-Warner Corporation, Detroit, Michigan Minster \$1-500 Fress used in production of clutch coverplates for the automative industry.

THE MINSTER MACHINE COMPAN

MINSTER

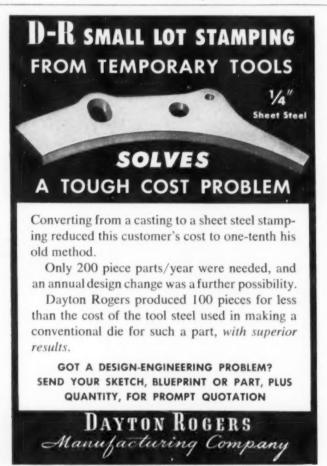
Bullard to make Hydra-Feed lathes

The Bullard Co., Bridgeport, Conn., has acquired the complete line of lathes from the Hydra-Feed Machine Tool Corp. of South Norwalk, Conn. and Detroit, Mich. The manufacture, sales and service of these automatic lathes will be handled in the Bullard plant in addition to its regular line of machine tools.

More money for sludge

Norton Company, Worcester, Mass., has announced an increase of approximately 10% in the allowance it will pay for diamonds reclaimed from grinding swarf and diamond wheel stubs returned for salvage by customers. Under the present table of allowances, the company will pay up to \$2.00 per carat for diamond reclaimed.

Many users of diamond grinding



MINNEAPOLIS 7C, MINNESOTA

JOHANSSON GAGING EQUIPMENT

Assures You
Precision to the
Finest Degree
to Meet Your
Requirements
—Backed by the
Name Supreme
in the World of
Measurement

GAGE BLOCKS

(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant.

INTERNAL INDICATORS

(for inside measurements .155 to 24 inches). Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.

MIKROKATOR

(Amplifier—for outside measurements) Graduations .0001 to .000001 or .01M to .0002M.

OTHER JOHANSSON PRODUCTS

Micrometers, Snap Gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators, Interferometers, Plugs, Rings and Special Gages.



MINIKATOR with height gage

The Minikator No. 590 is a micro-indicator especially designed for transferring dimensions and measuring in otherwise inaccessible places. The instrument is particularly suitable for indicating out-of-roundness or concentricity of grinding machine spindles and for locating drilling jigs. The amplification device of the Minikator is based on the Mikrokator Principle, it is purely mechanical and without friction and slackness. Measuring points of two different lengths $\frac{1}{4}$ diameter are supplied with every instrument. One point provides a measurement range of .003" (0.08 mm) with .00005" (0.001 mm) dial graduations and the other provides a range of .006" (0.16 mm) with .0001" (0.002 mm) dial graduations.

Write for Literature

C. E. JOHANSSON GAGE CO.

A DIVISION OF SWEDISH GAGE CO.

10641 HAGGERTY AVE. . BOX 4086 NORTHEASTERN STATION . DEARBORN 1, MICH.

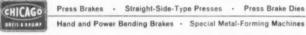
wheels have found reclaiming swarf and wheel stubs a practical means of substantially reducing their grinding costs. operations will continue under the same name with all present personnel.

Revonah buys Mummert-Dixon

The entire stock of the Mummert-Dixon Co. has been acquired by Revonah Spinning Mills, which will operate the machine manufacturing firm as a subsidiary. Mummert-Dixon Charles A. McGough, Jr., manager of the Mummert-Dixon tool division, has been named president of the machine company. Samuel B. Fortenbaugh, Jr., secretary-treasurer of both Revonah and the Wall Rope Works will hold a similar position in the Mummert-Dixon Co.







DREIS & KRUMP

MANUFACTURING CO.

South Loomis Boulevard, Chicago 36, Illinois



"Removable" Taper For Small Tools

Use low-cost straight shank small tools with GLENZER Sleeves to supply a REMOV-ABLE Taper, and get taper shank convenience at a fraction of the usual cost.

With rising material costs and scarcities, don't overlook the fact that one Glenzer Sleeve will supply the taper for dozens — perhaps hundreds of small tools before it needs replacement.

THE J. C. G L E N Z E R CO. Inc.

Test any stock size

30 days, subject to

return if it hasn't proven itself to

your satisfaction.

1546 E. NINE MILE ROAD, DETROIT 20, MICH.

Research program grows

Research volume soared to a new record at Armour Research Foundation of Illinois Institute of Technology, Chicago, during its 1955-56 fiscal year. The Foundation's gross volume totaled \$11,-910,000—about \$1 million more than during the prior year. More research projects were conducted than ever before in the Foundation's 20 years of operation: 691 programs—179 more than

during 1954-55. Of this total, 393 were for industry and 298 for government.

To meet the increasing demand for its services, the Foundation announced a \$5 million building program during the year.

When completed in 1966, the Foundation will have one of the most complete industrial research facilities in the world.



Precision-built Micro-Height reads faster than your micrometer! It measures height direct from zero at base to 3". Hundredths on barrel ... thousandths on large head that cuts reading time! Attach your dial indicator for quick measuring between holes, surfaces!

CUT LAYOUT TIME! Micro-Height also scribes like your vernier height gage. Riser extends range to 9". Precision-built, satin-chrome finished Micro-Height Gage quickly pays for itself!

Call your distributor or write

THE GREIST MANUFACTURING CO., 472 BLAKE ST., NEW HAVEN 15, CONN.

Precision Products since 1871

Rockwell valve plant being built

Construction has begun at Knox, Ind., on a new 35,000-square foot valve parts plant for Valve Products, Inc., subsidiary of Rockwell Mfg. Co. Located on a 20-acre site, the ultramodern plant will be of high bay construction and modular design, built so that further additions can be made in three directions.

The new plant is expected to be

completed during the first half of 1957. It will produce parts for Rockwell-Edward and Rockwell-Nordstrom valves.

John F. Shea

John F. Shea, vice-president in charge of sales for the Becco Chemical Div. of Food Machinery and Chemical Corp., Buffalo, N.Y., died recently after a long illness. He was 51 years old.

EFFICIENT-LOW COST

Dust Collection

Easy installation . . . efficient low-cost operation . . . simplified maintenance, make Dust-kop FIRST among equipment to collect most all industrial dusts. There are Dustkop models to eliminate your dust problems . . . that are space saving, self-contained units, or exhaust type for rafter, ceiling or outside location. Write for descriptive literature.





37 STANDARD MODELS
TO CHOOSE FROM
• READY TO USE

Also a Complete Line of Mist Collectors

AGET

MANUFACTURING COMPANY
1402 E. CHURCH ST. . ADRIAN, MICHIGAN

Mr. Shea was born and raised in Fitchburg, Mass., and received his technical education at the Lowell Textile Institute, Lowell, Mass. He joined Becco in 1930, serving first as a field representative and later as manager of the New England territory. He moved to Buffalo in 1953 when he was promoted to sales manager for the company, and in 1955 he was elected vice-president in charge of sales.

Gairing Tool sells assets

The Gairing Tool Co., Van Dyke, Mich., has sold its assets to the Ernest Kanzler interests of Detroit. The new owners will retain the name and continue its activity in the cutting tool industry.

Don F. Morse has been appointed vice-president and general manager. Bernard M. O'Meara, who has been associated with Gairing since 1919, has



Use postpaid card. Circle No. 357



SIMONOS

HAND EDGE HIGH SPEED Tungere 12"-167



BEND 'EM



TWIST 'EM



KINK 'EM



STEP ON 'EM

Ask for a Twister Demonstration, or better yet, try o "Red End" Blade yourself.

SIMONDS

"Red End" HACKSAW BLADES

(Hard Edge)

Simonds "Red End" Hand Blades are TOUGH AND FLEXIBLE! We make 'em of Simonds Cross-Rolled Steel for quick and easy cutting and longer life. SIMONDS CROSS-ROLLED PROCESS PROVIDES THE TOUGHEST GRAIN STRUCTURE FOR MAXIMUM RESISTÂNCE TO WEAR AND ABUSE.

Simonds offers three types of quality blades to do specific cutting jobs faster, easier, straighter: STANDARD STEEL for general all-around use; HIGH SPEED MOLYBDENUM for longer wear and dependable service; HIGH SPEED TUNGSTEN for best results in cutting tough alloy steels. Furnished in all standard lengths and tooth sizes for specific applications. All-Hard Blades are also available for those who prefer a rigid type blade. Make your hacksaw dollars go farther with Simonds "Red End" Blades.

For Fast Service from Complete Stocks

SIMONDS ndustrial Supply DISTRIBUTOR SIMONDS SAW AND STEEL CO.

Factory Branches in Beston, Chicage, Son Francisce and Fortland, Oregon Canadian Factory in Hantreal, Ober, Simonds Dirusons Simonds Steel Half, Eachparl, N. Y. Haller Taul Co., Newcompratoun, Ohio, Simonds Abresser Co., Phile, Pa. and Arvide, Que., Canada

been elected vice-president. William B. McClellan continues in his capacity of general sales manager. Other than the appointment of Morse, there will be no changes in the key personnel of the company.

New corporation formed

For administrative and operational purposes, the firm of A. Milne & Co. became incorporated Jan. 1, the seven-

tieth anniversary of its founding. The new corporation will assume all liabilities and assets of the partnership, and all contracts, leases, agreements, etc., will be continued unchanged.

Fosdick bought by LeBlond

The R. K. LeBlond Machine Tool Co., Cincinnati, has purchased The Fosdick Machine Tool Co. of the same city. Carl



No. 3-36 HYDRAULIC MILLING MACHINE

Now the new No. 3-36 in the Kent-Owens line of Milling Machines offers you the same unexcelled milling accuracy, speed and dependability for *larger size work*.

This ruggedly constructed miller has 36" table travel...64" x 16" table...full automatic hydraulic feed. Write for full specifications. Kent-Owens Machine Co., Toledo, Ohio.

Call on KENT-OWENS

for MILLING MACHINES

FORGING DIE

Material: Heppenstall 'A' Conventional Machining

Time: 40 hours Elox Setup & Machining

Time: 8 hours Saved: 32 hours

Machine tool: Elox Standard M-500 Electrode: Cast Elo-met #3 Customers report 75% time saving in re-working dies after washout no annealing is necessary

FROM THE HEART OF

work person have for the formation and formation of the profession of the profession for it for a feel for the formation of t

TUNGSTEN CARBIDE SINGLE POINT TOOLS

E D M produces 14 identically machined tools per hour Times include roughing and finishing, machining both faces, nose radius and top. Radius held to #. 001". Tools were produced by 1 man operating 2 Elox Tool & Cutter Grinders, using a brass wheel. Users report Elox ground tools give greatly increased life when compared to abrasive ground tools.



EDN



Version of the internal of the proportion of the color of

EMBOSSING DIE

Material: Air Hardened Tool Steel Die consists of 1,250 squares machined 100" x. 030" deep in the bottom section of the die. Sharp corners on each square had to be maintained.

Conventional Machining Time: 227 hours Elox Setup & Machining

Time: 10 hours Saved: 217 hours Machine Tool: Elox Standard M-500 ... 4 jobs that prove

blox puts you ahead of competition

sylverstand from the section of the

EXTRUSION DIE

Material: Air Hardened Tool Steel Conventional

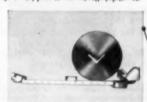
Electrode: Free machining brass

Machining Time: 4 hours

Elox Setup &

Machining Time: 1 hr. 38 min.
Saved: 2 Hrs. 22 min.
Machine Tool: Elox Standard M-500
Electrode: Free machining brass

Electrode: Free machining brass Machining is done after final heat treating . . . eliminating the possibility of distortion.



These jobs were done for Elox customers in our "Prove It" Division. There's more to them than just "man hours" saved. The Elox sales engineer in your area would like to give you all the details about these and other applications of Electrical Discharge Machining. Why not write...



1832 N. Stephenson Hwy. Royal Oak 3, Michigan E. Linden, Fosdick's general manager for over 23 years, has been appointed president and general manager of the Fosdick firm. All other Fosdick personnel will be retained.

The two firms will continue to do business independently. LeBlond builds lathes: Fosdick manufactures drilling. boring and grinding equipment.

Bendix Aviation and Sheffield join forces

Bendix Aviation has acquired the business and assets of the Sheffield Corp. All outstanding common stock of Sheffield will be exchanged for Bendix shares of equivalent value. Sheffield has called its preferred shares for redemption and proceeds will be



WOODWORTH CHUCKING EQUIPMENT

Yes, you could compare the delicate but firm technique of the Labrator Reviewer with the strong but Woodworth chucking accurate diaphragma equipment.

Your best machin alv as accurately as its work-holding a ormits and Woodworth d, accurate and de rate and dependable chucks for pu

and consideration of We invite your Woodworth chucking equipment.

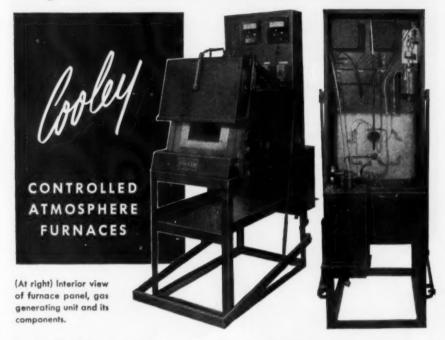
- Standard Diaphragm Chuck Air-Operated Diaphragm Chuck
- Bayel Gear Chuck
- **Double Diameter Gear Chuck**
- Finger Chuck

- Air-Operated Diaphragm Arber
 Push-Lock Arbor
- Twist-Lok Spline Arbor Tork-Lok Cellet Arbor
- Zere Spindle Inspection Fixture

WOODWORTH

1300 EAST NINE MILE ROAD DETROIT 20, MICHIGAN

Fully Automatic — Controlled Atmosphere



Tool Room Heat Treating Furnaces

Outstanding advantages—ability to consistently harden tool steels, clean and free from scale, with minimum attention from the operator—initial equipment low cost—moderate operating expense.

The atmosphere used in these furnaces is produced from alcohol and water which, when cracked at a constant temperature, produce gases of constant analysis. Research tables provide data for alcohol-water proportions and cracking temperatures for most commonly used steels. No further metallurgical information is needed. Two sizes—10" x 8" x 18" and 8" x 6" x 14"—for operation to 2000° F.

Catalog and complete information will be gladly furnished on request.

COOLEY ELECTRIC MANUFACTURING CORPORATION

36 S. SHELBY STREET . INDIANAPOLIS 7, INDIANA



ERICKSON TOOL COMPANY

2311-9 Hamilton Avenue . Cleveland 14, Ohio

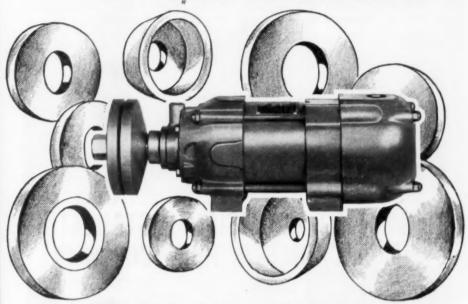
COLLET CHUCKS . FLOATING HOLDERS . TAP CHUCKS . TAP HOLDERS . AIR-OPERATED CHUCKS EXPANDING MANDRELS . EXPANDING COLLETS . SPECIAL HOLDING FIXTURES

Serving the Industry Since 1852



POSITIVE POWER

with a WOODS MOTOR ARBOR



Precision built and "tape insulated," WOODS motors are available in a wide variety of types and range from one to one hundred horse-power. Extremely adaptable for use requiring precision balance, a minimum of space and delivering the maximum of power. Why not investigate the advantages of these time-and-money saving motor arbors for your plant today?

Send for descriptive material



S. A. WOODS MACHINE CO.

Boston 27, Mass.

paid to Sheffield's preferred shareholders. No cash payment for common stock is involved.

Sheffield will continue to operate under its present management as an

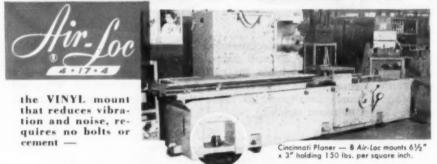
intact unit, retaining its corporate title as a wholly-owned subsidiary. Louis Polk, president of Sheffield, has become a director, vice-president and group executive of Bendix and a member of its administration committee.

New Plant for Imperial Stamp & Engraving

Imperial Stamp & Engraving Co. has announced the opening of a new plant at 8258 N. Christiana in Skokie, Ill. Formerly located in Chicago, the company now has a much larger working area, additional equipment.



PERMANENT PRECISION INSTALLATION OF MACHINES is POSSIBLE with



· Installations maintain accuracy to .0005" ·

Thousands of lathes, grinders etc. are now installed on patented Air-Loc mounts which can be re-used when machines are moved. Easy shimming for quick precision leveling. Write for free samples and literature.

AIR-LOC DIVISION Clark, Cutler, McDermott Co.

3 W. Central Street Franklin, Mass.



Especial supersunstitive production equipment controlled by high amplification instruments, plus Master Creftsmon make it precticable to hold the finished size of Sheffield thread gages unusually close to the gagemeter's high telerance limit.

75% 20% 5% HIGH LIMIT

- 5 27

SHEFFIELD GAGES

Furchasors of Shelfield threed gages can, on the average, expect to receive 75% of them within the upper third of the gagestator's februare zone, 20% about helf way and the rest between that point and basic.

SPECIFY SHEFFIELD and got more for your gage delices,
SPECIFY "Reventible" Physiol Play Gages and armovements

Gogo Division 10, The Shaffield Corporation
Dayton 1, Ohio, U.S.A.



SI

HEFFIELD

ANNELSTRALING AND REASONANCE AND MANKING

BASIC

McGill to Expand Bearing Plant



McGill Manufacturing Company's bearing division has set in motion a \$1.5 million expansion program. This is the second such expansion in less than three years.

Approximately \$900,000 will be spent for new machines, tools, and related equipment. An additional \$600,000 is

being designated for construction of 45,000 sq. ft. of additional manufacturing space. The program also includes remodeling of present plant facilities to improve manufacturing methods and handling of materials. Manufacturing capacity of the bearing division will be increased by 35 percent.

COOL CUTTING OILS

Hold size of work accurately and obtain closer tolerances at increased cutting speeds



LANCO COOLERS maintain any liquid in a coolant reservoir at room temperature, or lower. The cooler is furnished with a Fenwal Thermoswitch that has a sensitivity of $\pm~0.1^\circ$ F. A convenient outlet in the top of the cabinet cannects the Thermoswitch to a built-in load-carrying relay. The compressor is sealed in oil, and the condenser is air-cooled. The compact metal cabinet occupies a floor space only 14" x 14" and is 14" high, including casters. Standard cooling coil measures 9" in diameter, 2" in height, and has a 1-fcot straight length above. A 6-foot flexible hose connects coil to refrigerating unit, which operates on 115 volts, 60 cycles AC.

No. MT359-96 LANCO COOLER, each5375.00

Cooling coils can be made in special shapes dependent upon operating limitations. Flexible hose length can be increased to 10 feet. Write for information.



ARTHUR S. LaPINE and COMPANY 6001 SOUTH KNOX AVENUE CHICAGO 29, ILLINOIS, U.S.A.

LABORATORY SUPPLIES . EQUIPMENT . REAGENT AND INDUSTRIAL CHEMICALS



Hard-facing pump rod with the Metco Type P ThermoSpray Gun

High spraying speeds—high deposit efficiencies—simplified application

The advantages of applying hard-facing materials in powder form for lower finishing costs have long been known. But slow spraying speeds, low deposit efficiencies and high material costs have hindered their wide application. Now, with the development of the new METCO Type P THERMOSPRAY GUN and the THERMOSPRAY HARD-Facing Alloys, these disadvantages have been overcome.

The Thermospray gun is the first ever developed to operate without compressed air—only oxygen and gas (acetylene or hydrogen) are required. The Thermospray Powders are new, self-fluxing alloys of the nickel-chromium-boron type especially developed to provide dense, corrosion-resistant coatings with hardnesses varying from RC-30 to RC-65, depending on the alloy used. The new Gun applies these materials

faster than any previously available equipment (8 to 10 lbs. per hr.), with deposit efficiencies of over 95%. Depending on requirements, coatings may be fused after spraying, used semi-fused with a newly developed *Metco Process*, or left unfused.

Here is your opportunity to do your own hard-facing at low cost. For further information send off the coupon. No obligation, of course.

MHILL

Metallizing Engineering Co., Inc.

1115 Prospect Ave., Westbury, L. I., New York
Telephone: EDGEWOOD 4-1300

In Great Britain: Metallizing Equipment Co., Ltd.

Chobham near Woking, England
The following trade names are the property of
Metallizing Engineering Co., Inc.:
METCO'. ThermoSpray. "Reg. U. 8. Pat. Off.

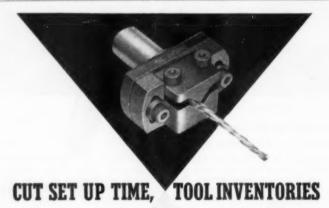
J. Bishop & Co. wins Almco award

Savings of \$6,917.50 in deburring and polishing of stainless steel tubular parts won second prize for J. Bishop & Co., Malvern, Pa., in a recent contest conducted by Almco, Division of Queen Stove Works, Inc., Albert Lea, Minnesota. The award included a \$50 check and a certificate.

The company cut their deburring costs 98.8% by using Almco barrel finishing equipment to remove burrs left by hand milling methods.

Spring division moves

The spring Division of Crucible Steel Co. of America has moved its sales headquarters to Pittsburgh from New York City according to an announcement by Thomas T. Crowley,



with Brookfield
Tool Holders*

Simple Things Pay
Off! The simpler they
are, the better they work.
What could be simpler than a
precision ground V-jaw vise for a
tool holder? If you had thought of it
first (and we don't know why you didn't)
you'd be selling them by the thousands, just as
Brookfield now is.

It's so simple, it's perfect. Just slip the tool into the V-jaw, tighten, and you're off and running with perfect alignment. No time-consuming setup adjustments. No costly bushings or collets to stock or make. Brookfields hold drills, reamers or cutters of any size within the range of any model. A new, colorful, information-packed brochure tells the whole story. It's yours free for the asking!

Write, wire, phone

*Patent No. 2472040

BROOKFIELD, INCORPORATED

STOUGHTON 1112, MASSACHUSETTS

West Coest Stocking Distributor; Jones Industrial Sales, 910 Geneva St., Glandale 7, Cal., Phone Citrus 1-3306

Use postpaid card. Circle No. 368

234

MACHINE and TOOL BLUE BOOK



Old skills modern facilities give you premium Carbide Tool performance

What makes a carbide tool outstanding?

Staple's answer: Ultra-modern facilities in the hands of the finest Cincinnati craftsmen. Your assurance of a new kind of carbide tool performance—whether special or standards!

Stub Screw Machine Reamers (Solid and Expansion Types) 2. Expansion Reamers (Patented) 3. Shell End Mills 4. End Mills 5. Twist Drills (solid and tipped) 6. Core Drills 7. Solid Chucking Reamers 8. Counterbores, Spotfacers,

THE Staples TOOL COMPANY
2352 Glendale—Milford Road
Evendale, Cincinnati 15, Ohio

general manager of the Division. The move will provide increased coordination of the activities of the division.

Nicholson File buys Danielson Mfg.

Nicholson File Co., Providence, R.I., has purchased the assets of The Danielson Mfg. Co., Danielson, Connecticut, makers of molded and extruded nylon products for industrial use, and has formed a new corporation of the same

name. This subsidiary will continue to be operated by its present management, in close cooperation with Nicholson executives, who plan to continue the manufacture of "Danco" products in enlarged plant facilities at Danielson.

Robert O. Knudson

Robert O. Knudson, assistant sales manager of the special machine-tool department of Greenlee Bros. & Co., Rockford, Ill., died December 19 after

TRIPLE-E Cylinder Clamps give you rugged construction longer operating life



HOOKS INTO EITHER AIR OR HYDRAULIC LINE

Operates on standard air line, or your hydraulic line.

COMPACT, RUGGED CLAMP CONSTRUCTION

All-welded bar stock insures strength. All pivot points are bushed with Merriman Broach Fit hardened bushings.

UNIQUE ADAPTER JOINS CYLINDER TO CLAMP

Prevents any deflection in clamp from being transmitted to the cylinder rod—for longer operating life.

CYLINDER IS COMPLETELY NON-CORROSIVE

End covers, tube and piston are made of brass—nickel plated for long wear and smooth action. All components oil-impervious. Hardened trunnion pins withstand wear.

Write for Tracing Templates and detailed Catalog Sheets

E & E ENGINEERING, Inc.

15023 Harper Avenue . Detroit 24, Michigan



These new Luers blades are held to precision tolerances on centrality and parallelism. Close tolerance grinding of all blade surfaces assures:

- Accuracy of blade size and complete blade interchangeability.
- 2. Centrality of head to shank held to close tolerance.
- Better blade cutting edges, longer blade-life, smoother cut-off surfaces

In addition you get all the established features of the Luers design, such as: hollow ground top which results in free chip action and cooler operation; constant side and angular clearances; resharpening on front face only.

Standard Luers blades are available from stock in 4 grades of high speed steel and in 4 grades of carbide tips. Solid cast alloy blades are also available on customer order.

Made under license issued by John Milton Luers

8780 GRINNELL AVE.

EMPIRE TOOL COMPANY

DETROIT 13, MICHIGAN

an illness of four weeks. He was 65 years old and had been an employee of the company for 34 years, originally in the engineering department. Mr.

Knudson was a graduate of Michigan State University and had membership in the ASME and ASTE.

Appointments and Promotions

Changes in Executive and Production Personnel

Name	Company	To	Position
Dr. Bela K. Erdoss		Korfund Co., Inc. Long Island City, N.Y.	President
C. J. Wilson	Mergenthaler Linetype Co. Brooklyn, N.Y.	The Bullard Co. Bridgeport, Cons.	Director of Manufacturing
Errett M. Grable	Wear-Ever International, Inc.	Firth Sterling Inc. Pittsburgh 30. Pa.	Director
Mark T. McKee			Director
W. R. Krapps	Crucible Steel Co. of America New York City, N.Y.	Same	Assist, to Gen. Mgr., Spring Div,

Changes in Sales and Service Personnel

Name	Company	To	Position
Richard C. Lawson	Crucible Steel Co. of America Pittsburgh, Pa.	Same	Sales Mgr., Spring Div.
L Paul Lee	Joseph T. Ryerson & Son. Inc. Milwaykee, Wis.	Same	



HOLDS SECURELY IN ANY POSITION

The 'original' dial indicator holder with push button control holds securely in any position, the original Dial Indicator Holder with pushbutton control, designed to provide the most secure and accurate hold for all dial indicators.



MAGNETIC BASE

For descriptive literature and address of sales agent in your area write to-

JAMES NEILL & CO. (U.S.A.) LTD.

37-39 PEARL ST . NEW YORK 4 MADE IN SHEFFIELD . ENGLAND BY JAMES NEILL & CO. (SHEFFIELD) LIMITED FOUND WHERE WORLD FAMOUS TRACTORS ARE "BORN"





GRAND RAPIDS NO. 55 HYDRAULIC FEED SURFACE GRANDER TO Table speed up to 125 fpm. Working surface of table is 12" x 36". Vertical movement of wheel head is 18". Preloaded ball bearing spindle greased for life. Spindle speed 1925 and 2500 zpm.





GALLMEYER & LIVINGSTON CO.

405 STRAIGHT AVE., S.W. GRAND RAPIDS, MICHIGAN



Dr. B. K. Erdoss



C. J. Wilson



Mark T. McKee



L. Paul Lee

suspension type

FLEXIBLE SHAFT MACHINE

eliminates tooling problem for I.B.M.



International Business Machines Corporation had the problem of reaming holes .813" in diameter in the mounting hanger on the main base of their 407 Accounting Machine. To eliminate expensive tooling for this operation, they selected a STOW V50 portable flexible shaft machine, which was specially fitted with an on-off switch mounted on the handpiece.

The V50 machine delivers 1150, 2100, 3450, or 5750 RPM, is furnished with a 6 foot flexible shaft. Other speeds can be achieved by using different size pulleys. (I.B.M. ran the reamer at 750 RPM.) Available in either 3/4, 1, 11/2 or 3 HP, the

V50 can be used for grinding, buffing, sanding, wire brushing and drilling.

STOW MANUFACTURING CO.

30 Shear Street

Binghamton, New York

Changes in Sales and Service Personnel

Name	Company	То	Position
Frederick H. Clarkson, Jr.	L. S. Starrett Co. Athol, Mass.	Taft-Peirce Mfg. Co. Woonsocket, R.I.	Advortising Mgr.
J. F. Zaman	Osborn Mfg. Co. Cleveland, O.	Same	Salesman
Herbert W. Fishtner	Pratt & Whitney Aircraft East Hartford, Conn.	Atrax Newington, Conn.	Sales Manager
Aifred J. Olsen	Joseph T. Ryerson & Sca Int. Chicago, III.	Same	General Sales Manager
Robert A. Daggit	Joseph T. Ryerson & Son, Inc. Chicago, III.	Same	Sales Manager
Scott Vrooman	Joseph T. Ryerson & Son, Inc. Chicago, III.	Same	Sales Manager
Robert G. Chown		Teglen Engineering Co., In South Pasadena, Calif.	. Valvair Saies Englassa
Samuel D. Conant	Jacobs Mfg. Co. West Hartford, Conn.	Same	Vice President, Sales

New Dealers and Distributors

Company	Address	Distributor for
Enos & Sanderson Co.	Buffalo, N.Y.	Electro Refractories & Abrasives Corp.

The ONLY Live Center On Which Points May Be Interchanged to ±.0001



and Turret Tool Posts.

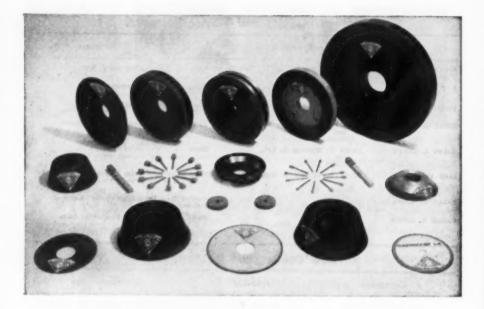
Empire Live Centers

Quality engineered for use on lathes, grinders, and milling machines . . . Empire Live Centers are versatile, accurate, heavy duty. Tapered seats give consistent precision alignment . . assure accuracy of .0001. Positive seal eliminates dirt, grit, cutting oils. Combination bearings absorb both radial and thrust loads.

Manufactured in all tapers: Morse, Brown & Sharpe, Jarno, and straight shank. Special shanks and points to order.

Empire Toolmaker's Set available in handrubbed American Walnut case.

ROYAL PRODUCTS, 84 Union Street, Mineola, L. I., N.Y. Ploneer 6-4245



ACE OF DIAMONDS brand diamond wheels frontrunners for excellence in American Industry. Assures you of the finest—maintained through modern facilities and rigid standards. ACE OF DIAMONDS a name to remember!!

Products of over 30 years experience

MANUFACTURERS OF:

Resinoid - Metal - Vitrified Diamond Wheels Powdered Metals
Allied Products



TELEPHONE: CEnter 9-4602

THE PAUL L. KUZMICK CO. 271-279 GROVE AVE., VERONA, N. J



3/8" - 7/16" - 1/2" and 5/8"

THIN SLOTTING CUTTERS

4"-5"-6"-8"-10" and 12" in diameter with Jack-Lock® Blade Locking Wedges

• Designed specially for milling thin slots accurately and efficiently. Jack-Lock wedges extend the full width of the body. Consequently, locking pressure is applied parallel to the sides of the body, assuring true running at all times. Cutting faces of the blades are milled and ground to provide the axial rakes required. Easily converted to a half-side mill by simply inserting blades all of one hand. Extra large hubs provide added ruggedness and rigidity. Easily mounted on a grinding arbor for resharpening. Unsurpassed performance. Write for a bulletin today!



CORPORATION

Engineering and Sales Representatives in the Principal Cities







- Radial swivelling arm combined with a freely swivelling head, allows handling of any job — even in awkward positions.
- Boring head can be canted to any angle (360°) and latched accurately in the vertical and horizontal positions.
 - Spindle speeds variable from 30 to 3070 rpm.
- Accessories include precision chuck, tapping heads, collets holder, adjustable boring head, facing and turning head, trepanning tool, boring bars, etc.
- Portable—take it right to the job.

Write for detailed information and prices to:

Mr. François Perret

c/o OLKON RESEARCH CORPORATION

630 Fifth Ave., New York 20, N. Y. • Tel.: Circle 6-0453

(Some exclusive territories still available)

SHELDON Precision LATHES

for the size Lathes You Need Most

Sheldon lathes are built in the sizes you need most, for toolroom and production jobs. They are available with swings of 10", 11" and 13"... in varying bed lengths with 18" to 48" center distances... and... in your choice of pedestal, cabinet or bench mountings.

Powerful, all-V-belt, drive units—either the standard 8-speed (or 16-speed) E-drive; or the production favorite, a rapid, levershift U-drive. Where higher spindle speeds are desired, the standard E-drive can be built to provide speeds up to 2,000 r.p.m.

All Sheldon Lathes have handscraped, built-in precision. Each lathe is guaranteed to meet or surpass the American Standards

for Toolroom Accuracy.
With every Sheldon
Lathe goes a copy of

Sheldon-Built Sebastian 13" and 15" Geared Head Precision Lathes



SHELDON SHELDON
Horizontal Milling Machine 12" Shaper

SHELDON MACHINE CO., Inc.

Builders of Sheldon Lathes, Milling Machines, Shapers and Sebastian Lathes.

4242 North Knox Ave . Chicago 41, III



the accuracy tests actually performed on that lathe. (19 checks).

Important optional features include: hardened bed ways, L00 Long Taper Key Drive spindles, 4" D1 Camlock spindles, bed turrets, taper attachments and a complete line of toolroom and production accessories.

The new Sheldon-built Sebastian Geared Head Lathes have greatly increased work capacity and many advanced features. These include a wide, heavy, hardened and ground bed . . . easy shifting spindle speed dial . . . 60-pitch gear box . . . independent drop lever apron clutches . . . cam-action tailstock clamp . . . and, automatic lubrication in the headstock and aprop with

"1-shot" lubrication of carriage.

Send in coupon or write for catalogs and names of nearest Sheldon and Sebastian Distributors where you can see these new lathes in operation.

SHELDON MACHINE CO. INC

35	SHELDON MACHINE CO., INC.						
7	4242	North	Knox	Avenue,	Chicago	41,	Illinois
ent	lemen:	Please	send	new catal	ogs descr	ibing	1:

Sheldon 10'', 11' 13" Lathes
Sebastian 13" and 15' Geared Head Lathes
Horizontal Milling Machine Name of Local Dealer
Sheldon 12" Shaper Have representative Call

Name Title

Company Name

Street Address

Company

eel Address Home

WHAT'S NEW IN METALWORKING

MACHINE AND TOOL

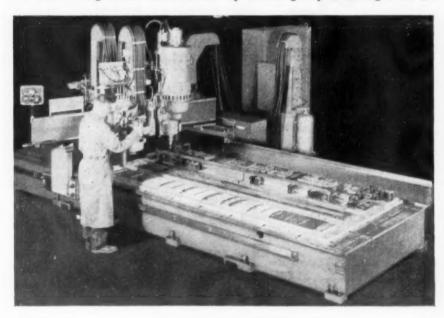
blue book

Edited by D. M. Carlson

Router has Power-Assist Mechanism

This Rigidmil router does not depend on the operator's strength to obtain maximum efficiency. A power-assist mechanism supplies the force required to feed the cutter through the work. Sizable work capacity is provided by a four-speed vertical spindle head rated at 15 hp at 7200 rpm.

Power is provided for all three basic movements required in machining with the router. Longitudinal movement of the gantry and transverse movement of the saddle are controlled by the operator through the power-assist mechanism. Depth movement is controlled by push button, with the downward movement being limited by a six-station manually indexed turret stop mounted on the saddle. Spindle speed changes are by means of push buttons located on the power-assist handles. The rigidly braced gantry is arranged on an



angle for an unobstructed view of both the follower and cutter.

Stationary table is 19 ft. long by 5½ ft. wide, with the spindle center covering a rectangular area over the table, 12 ft. long and 5 ft. wide. Either offset routing or overlay template work can be done with this machine.

Sundstrand Machine Tool Co., Dept. RB, Rockford, Ill.

Use postpaid card. Circle No. 33

Tracer Control System

The Hydro-Magnetic tracer is a magnetic sensing type stylus by which a closed two dimensional or 360° contour is reproduced automatically. No control action is required on the part of the operator other than predetermining maximum feed rates. Unit features an adjustable tracer and feed speed range that will remain constant along any 360° contour during tracing



• Write for FREE catalogs

Acme Scientific Company

1456 W. RANDOLPH ST. . MONROE 6-1834 . CHICAGO 7, ILL.

FREE!

Page after page shows the correct abrasive wheel to use

(for the best Blanchard grinding results)





Blanchard wheels in ollicate, resincid and vitrified bands,

This is our famous booklet The Art of Blanchard Surface Grinding — brought up-to-date with a third edition. It contains complete descriptions of our silicate, resinoid and vitrified bonded wheels. It also describes a number of jobs and shows you how to select the correct wheel for each job. Every Blanchard operator should have a copy handy — send for yours today.

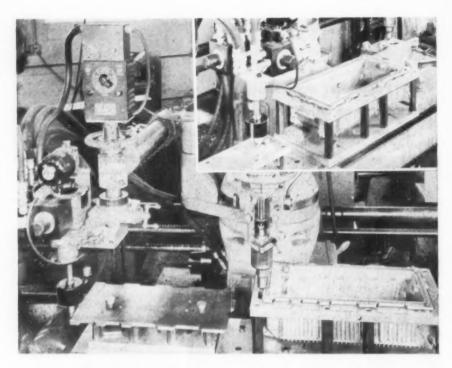
Blanchard wheels are guaranteed for uniformity of grade. They're best for Blanchard grinders, best for every job. They give you maximum production, utmost economy... whether the work is tough as copper or fragile as glass, whether it requires heavy roughing cuts or precision grinding within .000010" of absolute flatness and surface finish of 1 micro-inch.



THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS.

THE BLANCHARD MACHINE CO. 64 State St., Cambridge 39, Mans.	BETTE
Gentlemen:	
Please send me a free copy of "T Blanchard Surface Grinding" (3rd E	The Art of dition).
NAME	*******
FIRM	
STREET	
CITY	



operations. The result is a uniform surface finish.

Adaptable to any standard milling machine, the tracer control movements to saddle and table are through hydraulic cylinders replacing feed screws on table and saddle. The tracer valve is mounted in a vertical plane in direct relation to and parallel with the axis of the vertical spindle. Swivel type overarm provides a wide range of setting between the tracer and the vertical spindle to accommodate the largest work pieces that can be readily machined within the conventional travels of these mills.

Tracer valve is equipped with a builtin selector that enables the operator to use the valve as an automatic 360° pencil type tracer control. This feature allows the operator to machine pockets of a predetermined depth, using an oversized tracer stylus under hand control and then finish out the periphery of the pocket with the automatic 360° control.

Turchan Follower Machine Co., Dept. JS, 8259 Livernois Ave., Detroit 4, Mich.

Use postpaid card. Circle No. 84

Automatic coupling tapping machine

The 48T coupling tapping machine is designed for precision internal threading of oil tubular goods ranging from 1½" external upset tubing to 6" outside diameter casing. Pneumatically operated and electrically controlled, it features automatic operation with magazine feed. Other features include: variable spindle float; a receding chaser tap mechanism to assure threads of a positive and pre-



Skinner power chucks will cut your over-all machining costs

Right from the start, you begin to add up savings in cost-per-piece when you equip your production machines with Skinner Power Chucks. Instantaneous gripping and releasing by these air-powered Skinners cut substantially the over-all time required for machining.

If you're using manually operated chucks on your production machines, you're running your costs up with every cut, and wasting operators' time with hand wrenching.

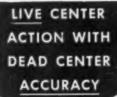
Skinner Power Chucks enable you to get the full time-saving advantages of modern engine and turret lathes by converting them to high production machines.

We'd like to show you how Skinner Power Chucks will reduce machining costs on production jobs in your plant. Write for Catalog 68P2, with complete specifications, applications and installation instructions.



THE SKINNER CHUCK COMPANY

NEW BRITAIN, CONNECTICUT



USE



ANTI-SCORING LUBRICANTS

PROVE IT TO YOURSELF IN

YOUR OWN PLANT FOR ONE

Free-running on dead centers—with COMPLETE protection. CMD Lubricants are CONCENTRATED, form a "tough" film—absolutely NO GALLING or SEIZING—under the heaviest load. STABILIZED for added "oiliness" giving longer, smoother runs without slip-stick action. It ali adds up to LIVE CENTER ACTION with DEAD CENTER PRECISION. The bigger the job, the better you'll like it.

TRIAL ORDER— TWO FOUR OZ. TUBES \$1.00

Send me my	order of	CMD	right	away
Bill me	Bill m	y com	pany	

Bill me Bill my company

Company Name_

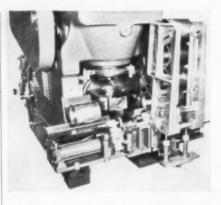
Address_

ty____State_

Chicago Manufacturing and Distributing Co. 1906 West 46th St., Chicago 9, Illinois

CHICAGO MANUFACTURING AND DISTRIBUTING CO.

Use postpaid card. Circle No. 384



cision taper with infinite settings from 34" to 0 taper per foot; detachable tap heads for wide range coverage with minimum tooling cost; setup ease; lead screw feed; precision worm and worm wheel drive; integral spindle and tap unit for increased rigidity.

Upon starting the machine cycle, a transfer mechanism moves the coupling from the bottom of magazine along slide plates into the chuck. Correct workpiece positioning in the chuck is assured by operation of the automatic workstop. The grips close and the chuck cylinder moves rearward from the loading position to the tapping area. It then indexes 90° to bring the coupling into tapping position for the first end. By engagement of a lock bolt, the chuck cylinder is positively locked into position for tapping.

The spindle and tap head unit drops rapidly to perform the threading operation, but is decelerated by a hydrocheck just prior to contacting the coupling. Then, the lead screw nuts engage, the tap trip ring contacts the coupling face and coolant is supplied. Simultaneously the tap head enters the workpiece to produce the thread at a pitch rate determined by the machine's lead screw.

During the threading, the trip ring and collapsing collar unit are arrested

"Ex-CL-Treat"...

A CHICAGO-LATROBE EXCLUSIVE

Regular industrial users of Chicago-Latrobe Drills and Reamers have come to expect extra mileage from Chicago-Latrobe products. There are a lot of good reasons for this, but one of the foremost is the *extra* heat treatment that we call "Ex-CL-Treat." "Ex-CL-Treat" is an exclusive with Chicago-Latrobe, as are these performance advantages that "Ex-CL-Treat" produces:

- (1) Greater lubricity for more efficient chip clearance.
- (2) Reduced galling that prevents loading on margins.
- (3) Strain reduction that lengthens tool life.
- (4) Added toughness that means less breakage.

If you have any reason whatsoever to question the performance of the drills you now use, we invite you to consult a Chicago-Latrobe Distributor. It is likely that Ex-CL-Treat can solve your problem.



"Ex-CL-Treat" Drills and Reamers

Chicago Latrobe



CHICAGO-LATROBE 418 W. Ontario St., Chicago 10, III.

OFFICES AND WAREHOUSES: NEW YORK • DETROIT • CHICAGO • LOS ANGELES
The stocks are large and the service is great from your local Distributor. Cell him.



No DIE SET PARTING PROBLEMS

WITH SUPERIOR REMOVABLE CAP GUIDE PINS

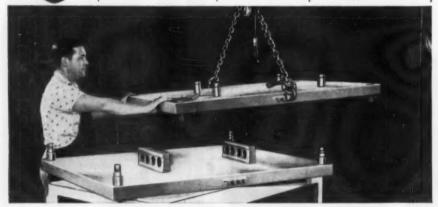
NOW on every Superior die set in diameters from 11/2" upward at no additional cost

Superior's Removable Cap Guide Pins eliminate punch holder binding on guide posts when parting dies. The cap is removed from the pin merely by loosening a socket head screw which holds the cap in place. This frees the punch holder at the most critical point of the pin where it is apt to cock or bind. Instead of needing 2 or 3 die makers to remove the punch holder from a set, one man can easily do this work alone in a few minutes.









for fast local service call these expert Superior representatives

Kalamazoo, Mich. Fireside 5-7988

Indianapolis, Ind. Clifford 5-5668

Rockford, III. 3-3931

Dayton, Ohio Hemieck 6209

Chicago, III, Randolph 6-8871

St. Louis, Me. Jeff 5-1223

Dallas, Texas

Winter Park, Fia. 4-0464

Minneapelis, Minn. FR 1-1321

Memphis, Tonn.

East Orange, N.J. Orange 5-5810

Denver, Colo. Enterprise 234

North Haven, Conn. Cedar 9-1661 Agawan, Mass. Republic 9-1132 Racine, Wis. Melrose 2-1900

Plants at Milwaukee, Mitchell 5-6027 Plainville, Conn. Sherwood 7-2761

Madison, N.J. Frontier 7-0407

Schenectady, N.Y. Franklin 2-4381

Steel Products Corp.

2754 Sc. 19th Street, Milwaukee, Wis

Use postpaid card. Circle No. 386

MACHINE and TOOL BLUE BOOK





SUPREME Leries-20"

BALL BEARING CHUCKS

True "tool-room quality" . . . that's the way to describe the new Supreme "Series 20" Ball Bearing Chucks. Wherever they are used . . . on drill presses, lathes, or for special jobs, they will do their work better than any similar tool in the world. Here's why:-SMOOTH, EASY OPERATION-effortless bit changes mean faster and easier work.

TIGHT GRIP-Eliminate all chance of damage to bit shanks.

EXTREME ACCURACY - The most precise chuck of its type ever built. LONGER CHUCK LIFE-Finest steels hardened by exclusive processes assure long, trouble-free service.

Supreme "Series-20" Ball Bearing Chucks are made in two sizes: Model 23T3-Capacity 0-1/2" Model 24T3-Capacity 1/8"-5/8"

Supreme now makes a complete line ... and a quality line in every way. Order from your distributor.



up front on America's finest power tools

SUPREME PRODUCTS CORP. 2222 S. CALUMET, CHICAGO 16



ALINA CORPORATION, 122 E. 2nd St., Mineola, L.I., N.Y. Please send FREE literature on the entire line of ALINA precision

Please send FREE literature on the entire line of ALINA precision measuring instruments.

NAME

ADDRESS

CITY_____STATE

FIRM

(Centinued from page 252)

by the coupling face and revolves in abuttment with it. Meanwhile, the tap-spindle combination passes through the collapsing collar actuating its chaser receding mechanism, which controls thread taper. Tap collapsing occurs as the trip plunger in the tap body is depressed upon contacting an adjustable thread length bar in the collapsing collar.

Tap collapsing action opens the lead screw nuts; the coolant flow stops and the spindle is rapidly returned to its uppermost position. With this upward movement, the tap expands.

The lock bolt which holds the chuck cylinder in tapping position is disengaged and the cylinder indexed 180°. The lock bolt re-engages and the opposite end of the coupling is tapped as

described above.

After completion of the second end, the lock bolt disengages and the chuck indexes 90° and moves forward to the loading position. The grips open and the entire cycle repeats with the completed coupling being expelled from the chuck by the one being loaded.

Production rates, at 100% efficiency, range from 96 per hour on 1½" line pipe couplings to 17 per hour for 5½" casing couplings. Standard merchant, conduit and special couplings can also be tapped on a high production basis. When straight threads are required, the machine can be setup to enable straight-through tapping and single indexing.

Landis Machine Co., Dept. RH, Waynesboro, Pa.

Use postpaid card, Circle No. 85

Releasing type tap holder

Multiple-spindle releasing-type tap holder for screw machine use operates on a simplified principle that eliminates many moving parts, minimizing wear and maintenance and extending the service life and efficiency of the tool. It can be changed quickly and simply for right-hand or left-hand tapping,

MIDWEST PORTABLE Elevating Table SAVES TIME

Leaves hands free



*2000 LBS. OR 1000 LBS. CAPACITIES
*ILLUSTRATED

A precision made MIDWEST TABLE Costs no more!

- It's hydraulic . . . positions work or feeds at desired height without use of hands
- Rigid cast construction
- ✓ Top turns 360° and clamps tight
- Foot release valve to lower
- Machined top surface can be used as work table
- Roller bearing casters with ball bearing swivels
- Floor clamping available extra

Write today . . . specials on request

TOOL & ENGINEERING CO.

112 WEBSTER ST., DAYTON 2, OHIO Use postpoid card. Circle No. 390

WHICH WHEEL...

Helps YOU most?

Each of these Multi-Use "Brightboys" Gives a Completely New Slant on Abrasive Applications

These new wheels will perform types of work never before associated with abrasives. Each comes in a wide selection of Silicon Carbide and Aluminum Oxide grains—each in grains from extra fine to extra coarse—each in soft, firm and tough rubber binders. Here are wheels exactly suited to your requirements—readily available STOCK numbers that not only do the work of "specials" but also countless usual finishing jobs.





What's Brightboy got that's different and better? PLENTY! The unique combination working-action of abrasive and rubber, that will BURR, FINISH, CLEAN, POLISH IN ONE OPERATION: save as much as 50% in time! Practically limitless applications. Applications you may never have associated with abrasives.

Ask your dealer to recommend the Brightboy grain and texture ideally suited to your jobs. Ask him for the Brightboy Catalog listing grains and textures, applications, machine speeds, work suggestions. Write us if he cannot supply you or on any problem in which finishing is involved.





BRIGHTBOY INDUSTRIAL DIVISION WELDON ROBERTS RUBBER CO. 95 N. 13th Street • Newark 7, N.J.

America's Pioneer Manufacturer of Rubber-Bonded Abrasives.





saving setup time. It automatically disengages at a predetermined tap depth to hold consistent tolerances on tapping operations. The positive reversing mechanism eliminates binding to reduce tap breakage. The rugged construction and rigidity of the tool is further increased by utilizing a floating bushing to compensate for misalignment of the tap and the work. The model illustrated has a 1½" hole and



Model U-TR 60,000 RPM UTILITY Pneumatic GRINDER



An outstanding, powerful, fast-cutting tool of proven high efficiency. Designed for the tough jobs and real production. Performs indefinitely and dependably. Precision made. Extra heavy spindle of special alloy steel. Grease-sealed bearings, no manual or automatic lubrication required. Steel housing for safety.

WRITE FOR LITERATURE



shank and includes a 1½" bushing. The same model is also available in a 25%" shank.

Marcellus Mfg. Co., Dept. RB, Belvidere, Ill.

Use postpaid card. Circle No. 86

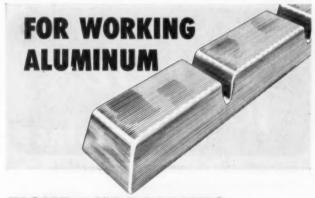
More power in new grinders

Lightweight 6" air grinder has an improved motor that is 50 per cent more powerful than previous models, has a



five-blade type motor with a one-piece rotor and shaft.

It is available in speeds of 4,500, 6,000, 9,000 and 12,000 r.p.m. Friction



FISKE LUBRICANTS are especially formulated for working aluminum and aluminum alloys. They will enable you to produce clean aluminum products at lower cost.

Machining C.S.A. No. 2 Cutting Oil
Rolling Majestic Soluble Oil
Die Casting 231 Die Casting Compound
Extruding S14A Hot Die Lubricant
Stamping Magic Compound
Forming Magic Compound

Let us know how you work aluminum and we will send you the bulletin that describes the Fiske Lubricant made for your industry.



METAL WORKING LUBRICANTS

FISKE BROTHERS REFINING CO.

Newark 5, N. J. and Toledo 5, Ohio Use postpaid card. Circle No. 394

and vibration have been reduced, air exhaust silenced to a minimum. Direct acting, tamperproof governor has an

adjustable governor spring.

The 4GG series grip type has a handle that is integral with the cylinder housing and employs a steel ball throttle valve. The 4GL series lever throttle handle is made of aluminum with a rubber sleeve for positive hand grip. The 4GB series button or butterfly type has an aluminum handle with longitudinal ridgings for firm grip. Throttle valve seats in steel bushings are made of stainless steel to prevent rusting.

All throttle types have a steel reducer bushing for hose connections. The grip type also has an automatic mist type lubricator. In the lever and button types, oil is inserted manually.

Thor Power Tool Co., Dept. RB.

Aurora, Ill.

Use postpaid card. Circle No. 87



automatically compensate for parallel AND angular misalignment

The oil, heat and wear resistant Neoprene insert, found only in "Tool-flex", provides a universal float that corrects for both parallel and angular misalignment. This assures quick setups and minimizes scrap due to bell mouthed and oversized holes or torn and oversized threads. By floating reamers, tape, etc., in a cushion of Neoprene, tool life is increased. Available in a range of sizes and models to suit any requirements, including close centers and Acme threaded shank for multiple spindle setups. "Tool-flex" holders are fully guaranteed.

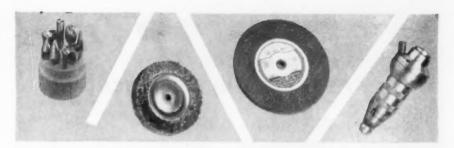
For complete information, write Dept. MT-2



BURG TOOL

Manufacturing Company, Inc. 15001 S. Figueroa St., Gardena, Calif.

RIDGEWOOD, N.J., CLEVELAND, DETROIT, CHICAGO, SAN LEANDRO, CALIF.



everything you need



from start to finish

Remember, when you're checking specifications and selecting equipment, don't fail to consider Haskins flexible shaft machines and accessories. Haskins' complete line of equipment insures faultless performance on your special and standard metal-working operations—without interruptions.

Whether you're grinding, wire-brushing, filing, whatever the job, a start with Haskins will carry you through from the beginning right down to a perfect finish. Our three models, bench, pedestal and suspended mounts, plus a multiplicity of metal-working tools, enable you to achieve faster production, lower labor costs and a superior finished part! Find out about the versatile line of Haskins flexible shaft machines and accessories—leaders in their field for over 30 years.

Write Today for a Catalog and Literature



R. G. HASKINS Co.

2645 West Harrison Street

Chicago 12, Illinois

reduce

BENDING COSTS WITH PEDRICK MULTIPLE BENDING

If cost is a critical factor in your bending operations for pipe, tube or structural metalwe've got news for you!

Multiple bending on Pedrick machines will cut those costs to the bone! Let us show you.

Write PEDRICK TOOL AND MACHINE Co., 3640 N. Lawrence St., Philadelphia 40, Pa. Dept. 3.





production benders

TAP WITH TAPMATIC



COMPLETE LINES FOR EITHER REVERSIBLE OR NON-REVERSIBLE SPINDLES

COMPLETE RANGE OF SIZES UP TO 2" TAP CAPACITY

CUT

PRODUCTION

OBTAIN GREATER PRECISION

POSITIVE TORQUE CONTROL

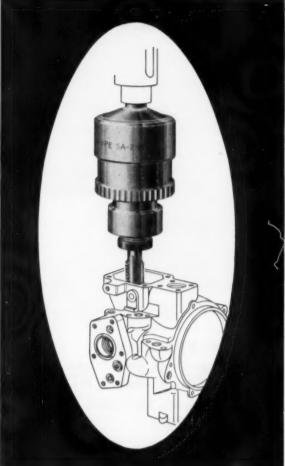
Only Tapmatic offers this "weightless tapping" feature... customary human lead error is eliminated ... consistently uniform threads are assured.

WEIGHTLESS FLOATING ACTION

Tapmatic's exclusive positive torque adjustment clutch stops tap instantly when tap becomes dull, loaded or bottoms in blind hole...operator sensitivity no longer a factor.

Literature Upon Request





TAPMATIC

CORPORATION

845 West 16th Street • Costa Mesa, California Phone Liberty 8-3404



"Vertical-Vibratory"

PARTS FEEDERS

Provide continuous, high-count, oriented feeding of small parts to automatic machinery

SYNTRON Vibrating Parts Feeders, with their unique, gentle vibrating action and rheostat-controlled rate of feed, have broadened the once limited field of feeding small parts. They increase production by orienting and feeding blanks, semi-finished or finished parts at a high rate to processing and assembly machines.

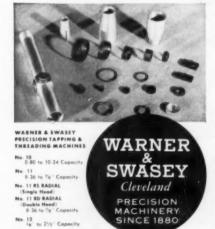
SYNTRON Vibrating Parts Feeders are adaptable to automatic machinery by means of gravity feed tracks with controlled escapements that deposit the oriented parts as required. They are designed for long, dependable service with little maintenance.

Send samples and data—our application engineers will be glad to submit recommendations. Or write for free catalog literature.

Write for FREE Catalogue Data SYNTRON COMPANY
300 Lexington Ave. Homer City, Pa.



Warner & Swasey Precision Tapping Machine



"TEXAN" telescopic rifle sights made by Norman-Ford & Company, Tyler, Texas, require high precision machining throughout for accurate optical alignment. That's why 0-80 to 15%" threads in retaining rings, cells, and windage and elevator adjusting screws are cut on their Warner & Swasey No. 11 Tapper.

This machine with its exclusive positive. leading-on principle—solenoid-actuated guide fingers operating on a hardened lead screw—assures precision tap lead, and eliminates shaving threads on the return stroke. This is important at Norman-Ford because of the fine pitches in relatively soft 24-ST aluminum alloy and mild steel parts.

If your work requires tapping Class 3 and 4 threads on a production basis, discuss with our Field Representative how a Warner & Swasey can speed work, cut scrap loss, and increase profits for you.

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY

Air pressure hydraulic valve

This hydraulic four-way valve, air pressure operated by air pilot valve, may be used automatically when the air pilot valve is controlled mechanically.

The model 5950 valve is available in standard action, spring-return, and spring-centered. With spring-return



valve, the piston is moved to original position when pilot pressure is drained off. It requires one air pilot line for re-

FLOATING LAMPS

Fit the Lighting to Each User and Each Job





Top-Mounted Reflector

Side-Mounted

Hir-Cooled Incandescent

or

Fluorescent

People . . . jobs . . . lighting needs differ. Let each employee control light loca-

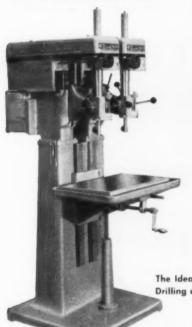


tion with the Dazor Floating Arm. It stays put without locking. Choice of Incandescent using 60-watt bulb in top- or side-mounted reflector, air-cooled for safe handling; or 2-tube Fluorescent. Universal and Pedestal models with 24" or 34" arm extension. Call your Dazor distributor. Dazor Manufacturing Corp., St. Louis 10. Mo.

EDLUND Sensitive Drilling Machine

MODEL 1F

Infinitely Variable Speed 10,000 R.P.M.





- INFINITELY VARIABLE SPEED CONTROL Simply turn knob for any speed within range of the machine. Swift, powerful, and positive action.
- MICROMETER GRADUATED DEPTH GAUGE Permits accurate pre-set depth control for all precision production drilling. Clearly graduated to .001"
- ADJUSTABLE SPINDLE TENSION CONTROL Compensates for different drilling conditions. Three handle feed lever reduces worker fatigue.

The Ideal Drilling Machine for High Speed Sensitive Drilling of Small Parts, Light Assemblies, and Instrumentation.

Model 1F-2 Spindle Pedestel Type

SPECIFICATIONS	
	-
verhang	7"
epocity (Cast Iron)	10"
1 Marse Taper or Jacobs Chuck	Ja"
peed Range — Optional	
625 to 3000 RFM	
1250 to 10000 EPM	

Spindles - 1 to 6 Fadactal and Banch Types

MACHINERY COMPANY Cortland, New York



EDLUND REPRESENTATIVES IN MAJOR CITIES

mote operation in one direction. Springcentered valves require air pilot lines to each end of valve for remote operation in either direction, and when both pilot pressures are drained off, the piston is spring-centered.

Designed for 1500 psi pressure, air pressure operated valves are offered in seven sizes: 1/4", 3/8", 1/2", 3/4", 1", 1-1/4" and 1-1/2". Spring-centered valves are available in five piston designs to meet

the requirements of any hydraulic circuit. Standard action and spring-return action valves are available in one piston design.

Rivett, Inc., Dept. DL, Brighton 35, Boston, Mass.

Use postpaid card. Circle No. 88

Cam feed drilling unit

The model 4000 cam feed drilling unit is completely enclosed and is



No ordinary bench drilling machine, but an extremely accurate, high speed, sensitive machine for precision drilling. Drills from $\frac{1}{4}$ " down to extremely small sizes. Successfully used down as far as .008".

Table and column exactly squared, one to the other, and built with strength and rigidity for maintained accuracy. Hardened and ground spindles insure long life. Sealed ball bearings throughout for smooth operation from 4,000 r.p.m. to 10,000 r.p.m. Motor, driving belt, and spindles entirely enclosed for safety. Available with 1, 2, 3 and 4 spindles.



SEND FOR
ILLUSTRATED
BULLETIN

SIGOURNEY TOOL COMPANY

(Division of The Smyth Mfg. Co.)
HARTFORD 6, CONNECTICUT

Sole-Sales Agent
RATT & WHITNEY COMPANY

INCORPORATED
West Hartford 1, Connecticut

lubricated by a Micro-Fog system. Linkage and gear segment actuating means to the spindle quill are eliminated by means of solid cam roller follower on the spindle quill, which moves in straight line in a hardened track. Cam leads can be reproduced in spindle carrier movement.

Clutching and declutching have been simplified by use of an air solenoid operated feed clutch, which gives in-



stantaneous response in starting and stopping cycle. The air clutch can be set to disengage at any desired feeding

Get this HANDY BUYING GUIDE for all your PRECISION SURFACE EQUIPMENT NEEDS

Here's the easy way to fill your precision surface equipment needs! This handy 16 page condensed catalog covers one of the broadest lines of surface equipment available today. Surface plates, bench plates, angle plates, box parallels, V-blocks, straight edges and many other types are offered in many standard sizes and with prices shown. They are easily available, too, from your local mill supply distributor. Get your copy from your local distributor or write

offered in sizes and with the si

Grand Haven, Michigan	MTBB-2		
Please send your latest ment Catalog No. 838W.		Precision	Equip
Name		Title	
Company			
Address			

pressure so that the tool is not forced to the breaking point under excessive resistance, yet performs each operation in the minimum practical time.

A single tool may be used in the spindle or a multiple head may be attached to the spindle carrier.

W. K. Millholland Machinery Co., Dept. HS, 6402 Westfield Blvd., Indianapolis 20, Ind.

Use postpaid card, Circle No. 89

Rotary table

This 12" rotary table features a base allowing both horizontal and vertical operation. The main bearing is bronze. Center-hole runout is no more than .0005" and parallelism through 360 degrees of rotation is guaranteed to .0001". All flat working surfaces are ground true and square and the table rotates on a scraped flat bed.

Two parallel clamping ears and ad-

GREEN MASTER FEED FINGERS

NOW... ADJUSTABLE AT THE MACHINE!



NEW NOSE CAP DESIGN CUTS DOWN-TIME

Now quick adjustments of finger tension are made on the feed finger without removal from the machine. The secret is in the new design with a removable nose cap for loosening or tightening the gripping tension.

Synthetic rubber inserts grip any size or kind of bar stock and protect it from scratching or scoring. The uniform tension will prevent any crimping when thin-wall tubing is used.



-

GREEN FULL FLOATING REAMER HOLDER

The Green reamer holder allows the reamer to float in any direction to compensate for any misalignment of the reamer and the drilled hole. Chatter and shock on cutting edges fully absorbed mean longer tool life. Available with either standard or tapered shank.

Write for catalog sheets and prices.

GREEN MANUFACTURING CO.

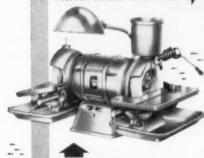


justable keys are provided for location and clamping the unit to a machine table in the horizontal position. In the vertical position the unit is bolted to the machine table through two 3" elongated slots in the vertical resting surface. These slots allow mounting on machine tables with T-slots of from 3" to 8-1/2" centers. There are four radial T-slots 37/64"x31/32". Over-all



Baldor GRINDERS with TOTALLY ENCLOSED MOTORS

600 Series Grinder. 1/3 HP, 1 phase, 60 cycle, 3450 RPM, 6" wheels, \$59.50 Pedestals available for all models



Carbide Tool Grinder. Sharpens quickly, accurately. Reversible $\frac{1}{2}$ HP motor withstands repeated overloads $1\frac{1}{2}$ wide wheels. \$171.70

BALDOR ELECTRIC CO.

Write for Bulletin 321-M



Specially engineered for extra heavy-duty, precision grinding! You can't get more regardless of price!

- Totally enclosed, splash-proof motors keep out dust, dirt, grit, metal particles. Can't clog...can't cause trouble!
- Lifetime lubricated ball-bearing motors never require servicing! Dynamic balancing assures smooth operation without vibration.
- Complete line—¼ HP to 3 HP, 6" to 12" individually balanced wheels. Bench and pedestal types.
- Fully guaranteed by Baldor—famous for fine grinders for more than 35 years!

It pays to use dependable Balder Grinders!

height in the horizontal position is 5". Length is 15-1/4". Width is 14". Table diameter is 12".

Universal Vise and Tool Co., Dept. JS. Parma, Mich.

Use postpaid card. Circle No. 90

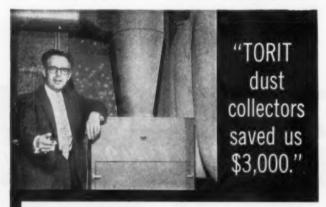
Standard push broaches

Shearcut dual purpose push broaches are produced as stock items. They can be used in punch presses, hydraulic presses, lathes. They can also be used



as rotary broaches in machines in which the part or tool rotates; they are particularly useful in finishing long holes.

Designed to remove from .005" to .015" of stock in the hole finishing



FREE BOOKLET shows you how to trap harmful dust better at less cost with TORIT.

Your plant can have the same initial savings and costcutting operation now enjoyed by the Sico Manufacturing Company, national producers of tables and seating equipment. Sico President, Kermit H. Wilson states, "... the lowest bid we had for a central dust collection system of minimum capacity was just under \$4,000. Our \$900 Torit installation has completely solved our dust problem and gives us greater flexibility than would be possible with a central system." There's a TORIT Collector to meet every type of dust problem, why not investigate?

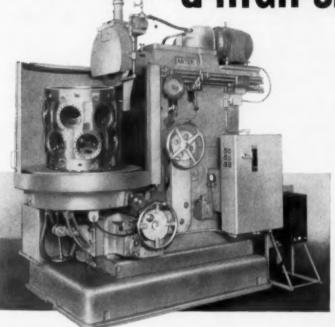
FREE facts on TORIT DUST COLLECTORS that reduce maintenance costs, up production, improve employee morale. Write today to:

TORIT MANUFACTURING CO.

287 Walnut Street, St. Paul 2, Minn., Dept.502



also makes a HIGH one



Vertical capacity of Arter Model B Hydraulic Rotary Surface Grinder can be increased 24" using a raising block. So, for grinding surfaces on such work as the crankshaft housing for the piston-type airplane engine, as shown, Arter has the answer. Arter has been building rotary surface grinders for nearly forty years. Model B is built in four sizes — 20", 24", 30" and 40" diameters.

Whatever your surface grinding needs, Arter can meet them.

ARTER GRINDING MACHINE COMPANY

WORCESTER 5, MASSACHUSETTS

Jigmatic Automatic Tape Controlled Positioning Table • Rotary Surface Grinders
Flat Circular Cutter Grinders • Internal Grinders • Cylindrical Grinders • Carbide Tool Grinders
AGENTS IN INDUSTRIAL CENTERS OF UNITED STATES AND CANADA

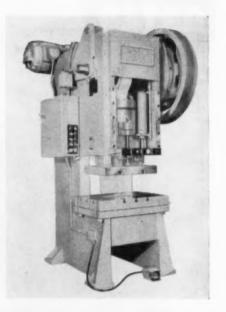
operation, they provide a fast method of finishing holes to exact size through a shearcutting action. Multiple spiral flutes provide a continuous cutting action. Tools may be used to finish holes that have internal grooves, such as hydraulic valve bodies, bushings. Standard sizes from ½" to 1" diameter in increments of 1/32".

Shearcut Tool Co., 7045 Darby Ave., Reseda, Calif.

Use postpaid card, Circle No. 91

75 ton C frame press

This fabricated steel frame 75 ton fixed base G1 press is available in either flywheel or geared types with single speed or variable speed drive for either type. It has long flanged slide with barrel type adjustment and box-type cast construction to eliminate way deflection and increase guiding to attain slide to bed parallelism so impor-



INDEXING MACHINERY - CAMS - GENEVA GEARS - TURNTABLES





MFG. REP. WANTED ASK FOR CATALOG No. 88-57 DR. CHARLES EISLER ME. FOUNDER CHARLES EISLER, JR. PRES.

FISLER ENGINEERING CO., INC.
762 SOUTH 13th STREET NEWARK 3, NEW JERSEY



MODERN-MAGIC CHUCKS & COLLETS

Change tools on the run...

- · Give multiple spindle output to single spindle machines
- Add extra stations to turret lathes
- · Offer one-piece body and shank construction

For full information on J&L Thread Tool Division Products . . .

Automatic Opening Die Heads & Chasers

Automatic Opening Collapsible Taps

Solid Adjustable Taps

Automatic Opening Stud Setters

Modern-Magic Chucks & Collets

A Complete Line of Accessories

... send for free booklet

JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, 520 Cilaton St., Springfield, Vt., U.S.A.



tant to die life and product accuracy. Available with standard manual slide adjustment or with air power adjustment.

Combination air friction clutch and brake unit is mounted on the crankshaft within the flywheel or main drive gear. On geared type press, the gears are totally enclosed running in oil.

Standard stroke of slide is 4" with a maximum 8" stroke available. Single speeds of 90 or 120 strokes per minute are standard for flywheel type presses and 40 spm for geared type. Bed area is 24" x 36". Slide area is 18" x 24".

Minster Machine Co., Dept. JS, Minster, O.

Use postpaid eard. Circle No. 92

Belt for high speeds

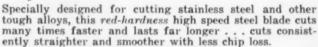
Spindle speeds in excess of 100,000 rpm can be maintained for extended periods over small pulleys without apparent damage to the Ultra-Speed belt,



the manufacturer claims. Adaptable for all high speed transmission jobs, this

9mmediate Delivery MILFORD REZISTOR®

HIGH SPEED STEEL BAND TOOLS



SUPPLIED CUT-TO-LENGTH AND WELDED . . . READY TO USE BUY FROM YOUR MILFORD DISTRIBUTOR . . . a local businessman who stocks the tools and equipment you need. You'll SAVE TIME, CUT BUYING COSTS and REDUCE INVENTORIES.



THE HENRY G. THOMPSON & SON CO.
Saw Blade Specialists for Over 80 Years
NEW HAVEN 5. CONNECTICUT

HACK SAW AND BAND SAW BLADES . HOLE SAWS . GROUND FLAT STOCK





FOR LESS THAN \$45 YOU GET 12 SETS. EACH SET GROUND READY TO GO

Men would not accept either idea at first . . .

INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades; they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For less than \$45 you get a dozen sets of 34—16 insert chasers, each set ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime. FREE: "Unified and American Screw Thread Digest."

THE EASTERN MACHINE SCREW CORPORATION 25-45 Barclay St., New Haven, Conn.

lightweight, high strength belt is noted for its flexibility and low elongation in service. It withstands the centrifugal forces exerted at ultra high speeds and the severe flexing action of small diameter spindles.

diameter spindles. Russell Mfg. Co., Dept. DL, Middletown, Conn.

Use postpaid card, Circle No. 93

Push-pull tapper

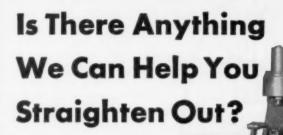
The Push-Pull tapper is an instant-reversing speed reduction unit made for tapping. It attaches to any portable drill. The speed reduction of 7:1 in the driving direction gives the operator more than adequate power to tap in all materials. Instant-reversing means that the direction of the tap can be reversed without stopping the drill motor. Thus the operator can move the tap into and out of the hole at will. In case chip accumulation is hindering the tap movement he can back it out a few turns—then drive it again—all without stopping. The hous-



ing of the unit is held in the fingertips, and any unusual strain is felt instantly. The tap stops when the fingers are released, and runs in reverse when the rear housing of the tool is held. It handles all taps up to 5/16"; the five necessary collets are included with the unit.

Supreme Products Corp., 2222 S. Calumet Ave., Chicago 16, Ill.









CHECKS AND BENDS IN THE SAME POSITION

Manufacturers with straightening, checking, and truing operations that require more than ordinary speed and accuracy have found Anderson Power Presses to be the answer to their problems. Here are the results they report:

"Straightened 30 pieces per hour with former equipment. With Anderson Press, 120 per hour. Production increase 400%."

"Anderson Power Press with its complete attachments is definitely more flexible for all types of straightening operations. It is faster, more accurate, and pressure is easily controlled. It is simple to operate."

"Formerly had a tolerance on drawing of plus or minus .002". After installing Anderson Press changed drawings to plus or minus 1/2 thousandth."

These actual reports from users prove that with an Anderson Power Press you get it straight — fast. Profit from low-cost high production, precision straightening.

Write for Bulletin 2-5



ANDERSON BROS. MFG. CO.

new ways to cut floor-to-floor time!

"Helicarb" milling cutters have a constant included cutting angle. The cutting load is uniformly distributed over the full length of the cutting edge. Cutters stay sharp longer, give far better dimensional control, better finishes, and greater stock removal. On many jobs, rough and finish cuts can be combined. Floor-to-floor time is drastically cut, reducing per-part cost.

These new cutters fully utilize the new advances in machine tool design. More and more shops—those that want a competitive edge—are using them. Why not you?



Shell Mills



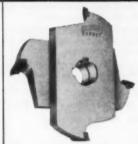
End Wills



Slab Mills



Staggered-Tooth Side Mills



Interlocking Side or Straddle Mills

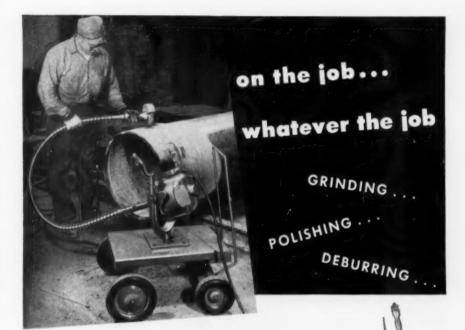


Attention! Nydraulic Parts Producers
If you produce A.N.D. 10050 port contours,
investigate the Sonnet A.N.D. Port Contour
Cutter that completes five operations in
one pass!



The original line of standard helical carbide milling cutters.

Manufactured by Sonnet Tool & Mfg. Co., 577 North Prairie Avenue, Hawthorne, California
Use postpoid cord. Circle No. 415



Whether you're grinding, polishing, deburring—or a vast number of other metalworking operations—you can be sure that Strand flexible shaft machines will handle the work easily and effectively in a minimum amount of time and with minimum operating expense.

For portability and operating convenience, Strand machines are what you need. They can be taken to—and operated in—virtually any spot in your plant. And only the lightweight handpiece is held by the operator, not a heavy motor.

The Strand bench, floor and vertical models are available from 1/4 to 3 horsepower with yoke mounts that enable the motor to adjust itself. Find out about the productive Strand flexible shaft machines now.

Write for a Catalog and the Name of Your Nearest
Strand Dealer Today!



5855 W. Lawrence Avenue · Chicago, Illinois



Machine Performs Many Abrasive Belt Operations

The extension arm assembly of the Model DBA-1F Flex-A-Belt machine can be rotated a full 360° on the motor hub for the most convenient operating position. Illustration shows a formed contact wheel grinding operation on a contoured piece. The following operations can also be performed: slack belt polishing or deburring application; flat grinding application on a platen; direct contact wheel grinding operation with a work rest; grinding or polishing operation on a hardto-get-at area with idler contact roll.

This double end motor unit is available in three varieties: with two belt arms; with one belt arm and one standard

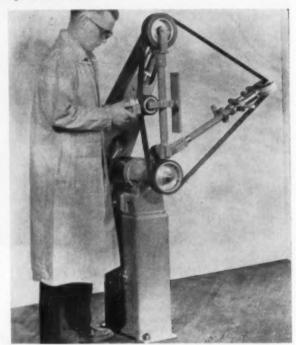
contact wheel grinding arm; with one belt arm and one side of the motor open for grinding wheel, buff or brush application. Curtis Machine Corp., 1300 E. Second St., Jamestown, N.Y.

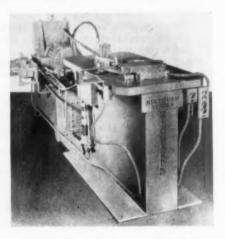
Use postpaid card, Circle No. 95

Bending machine

The Multiform Big Brother bender Model BB-CS Hydraulic is equipped with special tooling for production of tubular chair back supports, in various sizes. Table size is 30" x 56", height 40", standard ram stroke 4", bending power 25 tons, automatic production cycle 6 seconds.

J. A. Richards Co., Dept. JS, 903 N. Pitcher St., Kalamazoo, Mich.





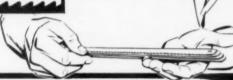
TO MEET AND BEAT HIGH PRODUCTION COSTS

compare the blades you're using with STAR



THE STAR BLADES GIVE ALL 5

- 1. Uniformity in fabrication
- 2. Proper Hardness
- 3. Efficient Tooth Design
- 4. Sufficient Set for Clearance
- 5. Clearly marked for Ease of Identification



Point 1 OF STAR'S S FEATURE CHECKLIST UNIFORMITY IN FABRICATION

All saw blades are made by a step-by-step process. But the finished blade will be perfect only if each preceding step is perfect. Star Blades are uniformly perfect because every step in the Star manufacturing process is done on super-accurate automatic machines—under the supervision of highly skilled operators.



- Second

No. 10 - Green molded handle. Almost indestructible. Shaped for comfort. Patented Lever-Lock positions, tensions blades automatically. No. 15 - Red molded handle, chrome-plate finish. Same features as No. 10.

Long a favorite with mechanics, this gunmetal finish adjustable pistol-grip frame with lever for lock blade features extra easy blade change.



STAR BLADES

Manufactured by

CLEMSON BROS., Inc., Middletown, N. Y., U. S. A.
Makers of Hand and Power Hacksow Blades, Frames, Metal and
Wood Cutting Band Saw Blades and Clemon Lawn Machines

-		-	-	-	_	
i.	Clemson	Sens.	Inc.			
	Middleto	neres Bil	W 41	2.4		

Please send the STAR Motal Cutting Guide that contains laformation on blade types, cutting techniques, feeds and speeds and

Pieces send the STAR Metal Cutting Chart-A handy guide for the shop metal worker.

Palm button valve is suitable for all general applications which require a normally closed straightway or three-way hand operated pilot valve. It was designed specifically for use in circuits where safety is of prime importance. Valve can be provided with lock, enabling it to be locked in either open or closed position. Ross Operating Valve Co., 120 E. Golden Gate, Detroit 3, Mich.



Use postpaid card, Circle No. 97



Slotting cutters. One hundred and two sizes of slotting cutters for aluminum and other light metals are available in the WAD series, in widths from % to 2 inches and diameters from 4 to 16 inches. Goddard & Goddard Co., 12280 Burt Rd., Detroit 23, Mich.

Use postpaid card. Circle No. 98

Heavy-duty adapters to accommodate a new series of 1½" shank diameter end mills for aluminum and its alloys. They are standard for No. 50 NS drive machines. Direct front-spindle flange mounting provides quick-change action by eliminating draw-in bolt. Four bolt holes and key slots make rigid mounting and positive drive. Goddard & Goddard Co., Dept. JS, Detroit 23, Mich.





flame hardened ways

AN
INTEGRAL
PART OF THE
BASE



machine will have ways an integral part of the base—and

> FLAME HARDENED

DETROIT



flame hardening co.

17644 Mt. Elliott Avenue • Detroit 12, Michigan • TWinbrook 1-2936 Use postpaid card. Circle No. 419

the

Portable nibbler operates on air power

This pneumatic metal cutting tool cuts up to 55 inches per minute through 10-gauge stainless steel without distortion on either side of the cut, leaving the edge ready for fabricating. Need for stationary metal-cutting equipment, acetylene torches is eliminated. The cutting operation is effortless because of actual metal displacement. Short turning radius allows for intricate patterns and special openings to be cut in sheet metal without special devices.

Nibbler weighs 13 lb., measures 13 inches in length. It operates on a heavyduty Cleco air motor, 30 cu. ft. per min., 90 lb. psi min., 5 hp 2-stage compressor. Its capacity is 10-gauge stainless, nickled, CR steel and galvanized iron, 8-gauge mild steel, aluminum, brass and other softer metals in proportion. Minimum cutting radius is six



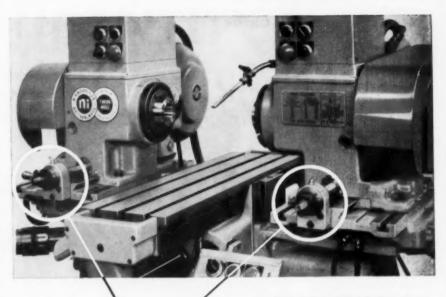
inches.

Fenway Machine Co., Dept. RS, Edgemont and Clementine Sts., Philadelphia 34. Pa.

Use postpaid card, Circle No. 100



3005 W. IIIth STREET . CHICAGO 43, ILLINOIS



NICHOLS TWIN MILL... SOMETHING NEW HAS BEEN ADDED

Now, the Nichols Twin Mill offers dovetail slides with micro-feed screws for longitudinal adjustment of milling heads, as well as transverse and vertical screw adjustments. With this new feature, the Nichols Twin Mill provides SIX-WAY ADJUSTABILITY FOR EACH MILLING HEAD IN SECONDS!

Adaptable for long or short-run jobs. The scope of Nichols Twin Mill utility is limited only by the imagination of the user.

THINK: Two geared milling heads—each completely independent with independent drives, push button controlled. Wide range of spindle speeds—55 to 2050 R.P.M. Vertical Head available for either or both

spindles. Automatic Table cycle with rapid approach, hydraulic-controlled variable cutting feed and rapid return.

THIS MEANS: The Milling Heads may be directly opposed or offset longitudinally, vertically or transversally. Ferrous or non-ferrous materials can be milled with HSS or carbide tipped cutters. IT ALL ADDS UP to top production with fine finish while TOLER-ANCES TO TENTHS are maintained with ease.

Complex light milling jobs can be milled faster and more economically with the Nichols Twin Mill. "Two Heads are better than one—for sure".

WRITE OR PHONE FOR FULL DETAILS-CATALOG.

Manufactured by W. H. NICHOLS COMPANY

National Distributors

THE ROBERT E. MORRIS COMPANY

5001 FARMINGTON AVE. . WEST HARTFORD 7, CONN.

Cabinet-Mounted Lathe

In the Derbyshire 750 steel cabinet-mounted lathe, the cabinet has a top surface of 48" in length, 21" deep, with an overall length of 54".

This precision tool has a ball bearing headstock, a runout of less than .0001" at headstock, lever collet closer, V-belt drive, six-position turret having %" holes for tools, compound rack and pinion slide rest and a front tool post having a swing of 360 degrees.

Overall length of lathe is 24", bed length 22", swing 5.905". Spindle speeds are variable, depending on pulley ratio, up to 10,000 rpm. Motor is a variable speed unit from 400 to 4275 rpm, with two speeds and full

reversing. Lathe has 5/16" capacity through the headstock. F. W. Derby-



shire, Dept. JP, Waltham, Mass.

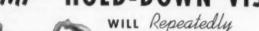
World's Largest Broaching Machine

A 240"-stroke electro-mechanical drive horizontal broaching machine, claimed to be the world's largest, broaches the "pine tree" holding slots

in the periphery of the gas turbine wheels of the new 16,500 kw gas turbine engine.

This 50-ft. machine broaches a slot

"IMP" HOLD-DOWN VISES



Chuck work with gage block accuracy. No hammering or fussing. 80% faster than any other holding device.

Write today for 8 page IMP VISE brochure

ILLINOIS METAL PRODUCTS 433 W. Superior Street, Chicago 10, Illinois

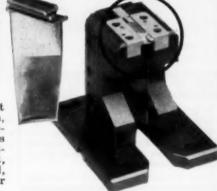
Use postpoid card. Circle No. 422

MACHINE and TOOL BLUE BOOK





These two precision component parts require equally precision, perfectly legible marking on specially designed Matthews Machines for positive identification and assembly. Regardless of your product, let Matthews provide engineered, custom-built Marking Tools for every production rate.



MARKING TOOLS FOR MODERN INDUSTRY

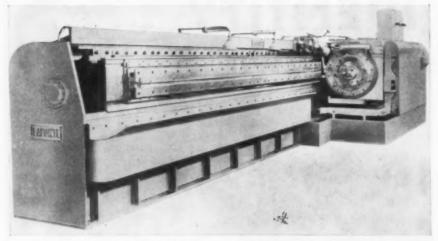
Write for complete information

JAS. H. MATTHEWS & CO.

3946 Forbes Street

Pittsburgh 13, Pa.

CHICAGO . BOSTON . PHILADELPHIA . CLIFTON . JACKSONVILLE



1.6" deep and up to 5" rim thickness, removing 150 lb. of metal per wheel. The actual broaching time per wheel is 2-1/3 hours. The slot is broached in two passes. The length of the broach cutting-section totals 450".

CAM MILLING

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horixontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC. 23-22 44th Road Long Island City 1, N. Y.

Use postpaid card. Circle No. 424

By changing broaching tools and using adapter plates on indexing fixture, each turbine and compressor wheel can be broached on the same machine. The variation in diameter of wheel broached on the indexing fixture is from 40" to 80", and the number of slots goes from 30 to 150. Index is held .0002" of true position. The broached form is held to within a tolerance of .0003".

The machine is of steel weldment construction and weighs 150,000 lb. An adjustable voltage 100 hp broach drive equipment drives a 16,000 lb. slide to assure smooth cutting action, increased tool life.

The Lapointe Machine Tool Co., Dept. DL. Hudson, Mass.

Use postpaid card. Circle No. 102



Multiform BENDER CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of disc and mandress to purch, bend, and out round or flat brass, bronze, aluminum, steel, etc., up to Arx1/5" as liftuatrated, other models up to ½"x4".

J. A. RICHARDS CO. KALAMAZOO, MICH.

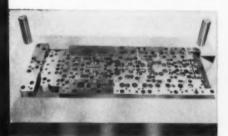
Use postpoid card. Circle No. 425

MACHINE and TOOL BLUE BOOK

Holes JIG GROUND

with Vulcanaire

Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.



A seven station die from Vulcan's contract Tool Room. Standard sized punches and buttons were used. But since forming and piercing operations were involved hardening of the sections was necessary followed by JIG GRINDING. Result: Close tolerances held easily and perfect progression throughout — another satisfied customer.



A five station indexing fixture from Vulcan's contract Tool Room. Using a jig borer index table with the Vulcanaire 5 indexing holes and 35 locating and clamping holes were JIG GROUND in place. Result—eliminated all close locating and dowelling of individual parts and of course hours of time.

*Vulcanaire equipment pays for itself on the first job.

Borrow Vulcan's 11 minute movie on jig grinding.

41ST YEAR OF VULCAN SERVICE

Services of YOUR TOOL ROOM in Dayton

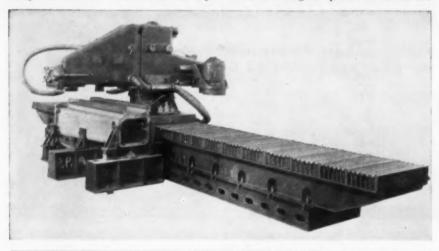
Engineering, Processing, Designing . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and Size . . . Vulcanaire Grinding Heads . . . Motorized Rotary Tables . . . Plastic Tooling . . . Vulcanaire Jig Grinders.

VULCAN TOOL CO. 710 Highland Ave. DAYTON 10, OHIO

Way Guards

Can-Pro way guards expand and

machine regardless of either horizontal, compress with the movement of any vertical or angular positions. All of the



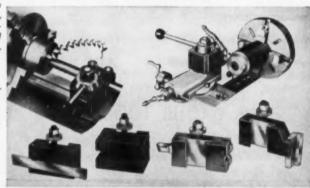
QUICK CHANGE TOOL POSTS & HOLDERS

Speed Your Operation Save You Money

Only a second to change tools for turning, facing, drilling, boring, threading, knurling, cutting off or any other operation.

- · GREAT REPETITIVE ACCURACY.
- . RUGGED CONSTRUCTION.
- TESTED AND RECOM-MENDED BY LEADING LATHE MANUFACTURERS.
- . GREATER RIGIDITY.
- SAVES 90% IN SET-UP TIME.
- · UNCONDITIONALLY GUARANTEED.

Write for catalog and price list.



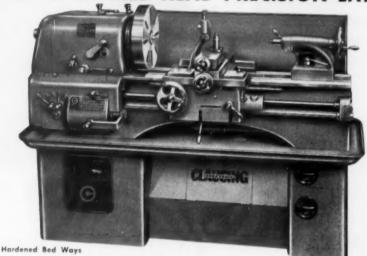
ALORIS TOOL CO., INC.

131-37 SANFORD AVENUE FLUSHING 55, N Y

Use postpaid card. Circle No. 427

MATHINE and TOOL BLUE BOOK

See how you get with... 13'-15'-17" GEARED-HEAD PRECISION LATHES



BIG CAPACITY—larger spindle capacities (see chart below). Swing for the gap bed models is 28" for the 17"; 24" for the 15"; and 18" for the 13". Between centers capacities: 78" for the 17" lathe: 30" and 48" for the 15"; and 24" and 36" for the 13". Geared-head drive powered by multiple V-belts.

CAPACITY	17"	15"	13"	
THRU-HOLE	31/16"	21/16"	19/16"	
NOSE TAPER	L-2	L-1	L-0	

HEAVY-DUTY CONSTRUCTION - Massive semi-steel beds with elliptical cross ribbing. Induction hardened, precision-ground V and flat bed ways. Gearedhead and quick-change box run in bath of oil, all gears shaved and hardened. Power feeds taken from separate feed rod, lead screw used only for screw cutting. Note heavy-duty construction of tailstock, and of carriage assembly with double-walled apron.

PRECISION PERFORMANCE—built to American toolroom lathe standards of accuracy. Have GAMET MICRON tapered roller bearings . . . with oil flow lubrication . . . most advanced and accurate bearings known to industry.

PROMPT DELIVERIES - through your authorized CLAUSING-COLCHESTER dealer.

OUTSTANDING QUALITY and VALUE - Clausing-Colchester lathes are acknowledged the world over to be the finest value and the most accurate in their class!

PRICES - 13" cabinet base models, including motor and controls, start at \$1952; 15" cabinet base, illustrated at \$2744; 17" model at \$4345. 5 straight bed and 6 gap bed models available, with choice of one or two speed motors.

WRITE FOR ILLUSTRATED LITERATURE

CLAUSING DIVISION ATLAS PRESS COMPANY

KALAMAZOO, MICHIGAN

Use postpaid card. Circle No. 428

February, 1957

295

folds expand equally and simultaneously. Special materials, such as flexible neoprene with its oil and heat resistant characteristics, are used for maximum protection and long life. Can-Pro Corp., Dept. MT, Fond du Lac, Wis.

Use postpaid card. Circle No. 103

Hydraulic elevating table

This foot-actuated hydraulic elevating table is made of rigid castings with machined table surface and is mounted on roller bearing casters with ball bearing swivels. One ton capacity.

The top rotates 360° and clamps in any position. The hydraulic foot control lever makes it possible to pump the table to desired height without the use of hands. Foot release valve lowers table.

Specifications: maximum table height from floor (raised) 46½ inches; minimum table height from floor (lowered) 31 inches; table size—24" x 30"; base size—26" x 31".



The Midwest Tool and Engineering Co., Dept. JS, 114 Webster St., Dayton, O.



itself 5 times faster than it depreciates!"



"Our Liquid Honing machine," Mr. Stowe continues, "enables us to remove heat-treat scale instead of waiting for the heat treater to do it. Consequently, customers get faster job deliveries.

"In only one-fourth usual time, Liquid Honing cleans molds for repairs or remodeling — and ends what used to be a difficult, tedious hand operation.

"Many die casting and plastic molds now go out with an oil-retaining Liquid Honed satin finish that eliminates hand polishing after final heat treating.

"In addition, we clean hand tools, spare machine parts, cutting tools, electrical contacts — anything small enough to go into our machine. So it's easy to understand why Liquid Honing will pay for itself within a year — five times faster than it depreciates!"

That's the Stowe story—a "preview" of a few of many advantages Liquid Honing can bring to your tool room, machine shop or die department. You'll be surprised at the low cost — only \$550 to \$1500 for a standard machine.

Write for details or send a sample part for free demonstration processing.

*Vapor Blast and Liquid Honing are trademarks.

VAPOR BLAST MFG. CO. 3123 W. Atkinson Ave. Milwaukee 16, Wisconsin



BOX TYPE RAM

BAR TYPE RAM KNOCKOUT

AIR RAM COUNTERBALANCE

AIR FRICTION CLUTCH WITH MECHANICALLY-INTERCONNECTED BRAKE

AUTOMATIC LUBRICATION

ADJUSTABLE, HINGED BED

HIGH TENSILE SEMI-STEEL CAST FRAME

for all-around use in many applications

FERRACUTE combination
ADJUSTABLE
BED & KNEE PRESS

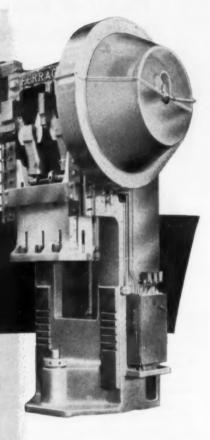
WRITE FOR COMPLETE DETAILS

Available in 75-ton to 200-ton models

FERRACUTE MACHINE COMPANY
East Commerce Street, Bridgeton, N. I.

Since 1863, Manufacturers of Power Presses, Press Brakes and Special Machinery

FERRACUTE



CAG-200 200 ton model with bed removed

Now - Buck Precision and Savings in 10" and 12" Chucks



Dead True Precision Within One Minute

.0005" Precision On Duplicate Parts

Compensate For Wear As You Adjust

If you've wanted large universal scroll chucks with Buck precision you can get them now. Both 6 jaw and 3 jaw are in production.

You really save when you chuck with Buck. Any machinist or setup man can adjust a Buck to dead true in 1 minute. Inexperienced operators can then chuck duplicate parts within .0005" precision without further adjustment. You have never had such precision before with universal scroll chucks.

In addition, the Buck Ajust-Tru principle compensates for spindle run-out, permits adaption to different types of machines, and automatically compensates for wear.

Get the full details about the unusual performance features of all Buck chucks. Write for new catalog today.

BUCK TOOL COMPANY

212 SCHIPPERS LANE . KALAMAZOO, MICH.

Rotating diamond tool holder

The Turnit rotating diamond tool holder is available for either manual or automatic operation and easily installed on either external or internal grinders. Rotating head presents a continuous new diamond edge against the grinding wheel, thus reducing wheel wear, saving diamonds, giving superior work finish, and eliminating diamond

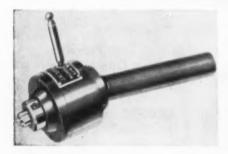
heat. Units are available to fit most types and models of grinders.

J. K. Smit & Sons, Inc., Dept. RS, Murray Hill, N.J.

Use postpaid card, Circle No. 105

Center finding device

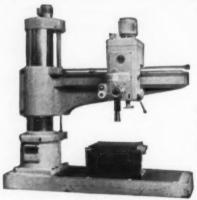
The center finding device called the "Wiggler" is a one-piece, battery-powered unit that fits into a lathe chuck, drill press, jig bore or other machine and enables the operator to accurately





locate the blueprint coordinates of the workpiece. A battery-powered electrical contact lights a bulb continuously when the work is properly positioned.

Made entirely of noncorrosive material, the unit will not rust, Standard



"WEBO"

WORLD FAMOUS RADIAL DRILLING MACHINES

in a wide range of sizes and capacities.

FROM $2-\frac{1}{2}$ arm, $9-\frac{7}{8}$ column to 8' arm with $19-\frac{3}{4}$ column

GREAT RANGE OF SPEEDS

LOW FIRST COST, EFFICIENT IN OPERATION AND ECONOMICAL IN MAINTENANCE

DISTRIBUTORS IN UNITED STATES

NEW ENGLAND & ATLANTIC STATES TRANSMARES CORP. 15 WILLIAM STREET NEW YORK 5. N.Y. CENTRAL & WESTERN STATES
JAMES W. GEORGE MACHINERY CO.
519 EAST JEFFERSON AVENUE
DETROIT 26, MICHIGAN

batteries are used for power and changes are made by use of a simple screw cap.

Armand Products, Inc., 20 W. Morrill Ave., Columbus. O.

Use postpaid eard. Circle No. 106

Short length power drills

Short length power drills in fractional and wire gauge sizes are of the same specifications as screw machine drills except for heavier webs, which



make them particularly suitable for use in portable machines.

Drills withstand considerable strain. They are recommended for drilling truck and auto bodies, sheet metal and stainless steels.

Whitman & Barnes, Dept. JS, 40600 Plymouth Rd., Plymouth, Mich.

Use postpaid card, Circle No. 107

HYBCO TAP GRINDER

Sharpens Chamfers, Flutes and Spiral Points



Model 1100

• Capacities Ho. 0 Machine Screw to 11/2" Hand Taps

HENRY P. BOGGIS & CO.

Use postpaid card. Circle No. 434

Another

VICTOR VALUE



Top Quality Lowest Prices

Our special import...

DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Our New Price		
3.30		
5.80		
8.75		
1.75		
7.25		
3.00		
00.00		
37.00		

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

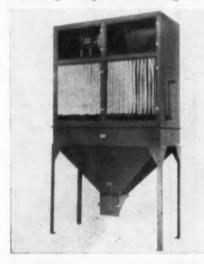
Order today—Immediate Delivery from Stock!

VICTOR

MACHINERY EXCHANGE, INC.
Dealers in Tool Room Equipment
Dept. A, 251 Centre St.
Tel.: GAnal 6-5575, New York 12, N.Y.

Heavy duty dust collector

Designed to handle heavy-duty continuous grinding and other high dust



volume sources, the Model 123 dust collector handles as many as eight grinding wheels at a time. It has a dust storage capacity of 10 cubic feet and a filter area of 300 square feet. Its 5 hp motor moves approximately 2000 cubic feet of air per minute through an 8" inlet at speeds of more than a mile a minute. Static pressure for this inlet is 3½" water.

Torit Mfg. Co., Dept. KP-RB, 287 Walnut St., St. Paul 2, Minn.

Use pestpaid card. Circle No. 108

Impact bench press

The Pneumark impact bench press, designed to stamp lettering or numbers into steel parts is powerful and fast. Die space is quickly changed by means of handle at right side of column. Solid steel base is drilled and tapped with 6½—13 holes for fastening fixtures or nests. Lettering tools use a 1" round shank. Press is operated by means of



WISCONSIN Tapping Units and Tapping Heads for Precision Tapping on Your

Precision Tapping on Your Special Machines

The Wisconsin Model TU-415 Lead Screw Tapping Unit pictured here is completely self contained, may be mounted in any position, and is sealed against coolant entry. Regularly furnished with a flanged quill and slotted spindles for close coupled multiple spindle tapping heads. May be obtained without quill flange for single-spindle tapping.



WISCONSIN Multiple Spindle Tapping Head



WISCONSIN Special Machines



Special 8 Station Machine

Tapping Unit

Drills, reams, spot-faces, taps and mills 3 different sizes of connecting rods for outboard motors. It features automatic clamping and utilizes adjustable drilling and tapping heads at various stations.

WISCONSIN Adjustable
Drill Heads — available in standard
sizes. Fixed Spindle Drill Heads built to your
specifications.

Literature Sent Upon Request. Write -



WISCONSIN DRILL HEAD CO.

4981 NORTH 124th STREET . BUTLER, WISCONSIN

Use postpaid card, Circle No. 437

A56-9030

303



solenoid controlled valve which opens only when both hand control buttons are pressed simultaneously.

Geo. T. Schmidt, Inc., Dept. RB, 1802 Belle Plaine Ave., Chicago 13, Ill.

Use postpald card. Circle No. 109

Grinding wheel lock requires no hammering

The Glare Gearnut replaces the spanner wrench for recessed, cup, and rubber grinding wheels used with surface grinders, cutter grinders, and small o.d. grinders. Operator can lock nut without touching wheel. Deep recess wheels are locked easily. Unit reduces wheel breakage, skinned knuckles, wasted time.

The keyed washer has been replaced by a keyed washer of large diameter that has two holes 180° apart. The wrench has pilot and gear. Nut has gear teeth on the periphery. In applica-



Engineered Live Centers designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience Characteristic of the design of all STURDIMATIC LIVE

of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse taper carried in stock.



Today's Standard in Precision Surfaces

MACHINE PRODUCTS



SURFACE PLATES . . . Specially heat treated cast iron to eliminate distortion and to insure dimensional accuracy . . . triangular rib supported to resist load deflection . . . finished to exacting precision specifications . . . ample top thickness to permit resurfacing operations.

> Standard sizes from 7 x 71/2 to 72 x 168. Extra large and heavy duty plates also available.



FLOOR PLATES . . . May be utilized for either layout or fixtures . . . features an adjustability of .002" in any direction . . . offers the convenience of 2" clamping ledges on both sides and ends. And, if desired, cast iron plates can be furnished with machined scribed lines.

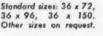
Offered in any size up to 10' x 20' in one piece or sections. Quotations on plates, fixtures or both furnished on request.

LAYOUT PLATES . . .



Designed to facilitate layout work . . . flawlessly surfaced to meet today's precise requirements in inspection . . . ruggedly constructed to permit mounting of unit heads for machining operations.

Standard sizes: 36 x 72.





able to recondition worn equipment to your "specs."

Catalog containing descriptions, specifications on Machine Products plates and accessories.

ne product Corporation

6771 E. McNICHOLS ROAD . DETROIT 12, MICHIGAN



tion, the pilot of the key wrench is inserted into the pilot holes of the washer and turns the nut home. Nut is locked without hammering. Set includes washer-nut and key.

Glare Products Co., P.O. Box 4876, Redford Station, Detroit 19, Mich.

Use postpaid card. Circle No. 110

Center finder

This center finder provides a simple, accurate method of establishing centers in holes from 1" to 2½", 2½" to 6", or from 6" to 15". Larger sizes of the unit are available on special request—up to 48" diameters. Centers are accurate within .001".





A counterclockwise turn of an Allen wrench extends three equal length pins which make contact with the inside wall of the hole, then are locked in place with a thumb screw. Either a divider point or trammel is available on the center button of the tool.

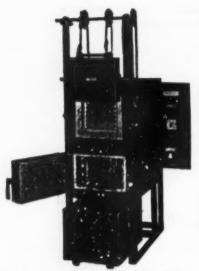
The C & B Tool and Machine Co., Dept. HS, 106 S. LaGrange Rd., La Grange, Ill.

Use postpaid eard, Circle No. III

Combined verticalhorizontal miller

The Abene Model VHF-2B milling machine combines the work of vertical and horizontal millers. The spindle can be placed at right angle with the longitudinal line of the table and is adjustable for any angle, from 0° in the horizontal plane to 45° over the vertical plane. The spindle nose retains the same long distance from the table in





SERIES # 8055 COMBINATION MODEL

Two independent furnaces (hardening and drawing) in the same floor space one requires. Complete with independent controls. Hardening furnace available in both a 2000° and a 2300° F. range.

Drawing furnace has a maximum of 800° F.* Quench tank included with the exception of the largest standard model.

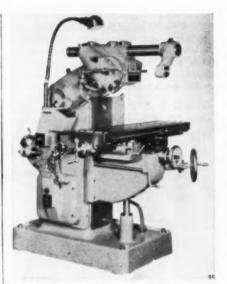
Chamber Size			. 5	lize	Prices		
H.		W.		L	2000° F.	2300° F.	
600	×	6"	×	12"	\$ 750.00	\$ 850.00	
9"	×	9"	×	18"	1150.00	1250.00	
12"	×	12"	×	24"	1600.00	1700.00	
18"	×	18"	×	36"	2400.00	2500.00	

*Also available up to 1250° F.

WRITE FOR FREE LITERATURE, SPECIFICATIONS and price list of Lucifer Furnaces in wide range of sizes—dep loading and side loading types. Engineering advice without obligation. Write, wire or phone today.

LUCIFER FURNACES, INC.

NESHAMINY 1, PA. Phone Osberne 5-6411



both horizontal and vertical positions.

The spindle is journalled in adjustable SKF roller bearings. The gears of the gear box run in oil, the shafts there being journalled in roller bearings.

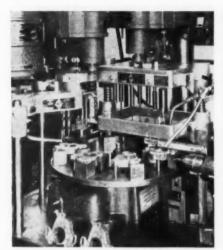
Standard machines are provided with Morse No. 4 tapers. Table size: 40" x 104". Twelve spindle speeds, from 50 to 1.300 rpm.

Aaron Machinery Co., Inc., Dept. RS, 45 Crosby St., New York 12, N. Y.

Machine drills, taps, reams, deburrs simultaneously

Every nine seconds, all at one time, ten holes are drilled, four deburred and two are tapped in an aluminum alloy diecasting on the special fourway drilling and tapping machine shown here.

The part is a plate-cast stator for the magneto of a small gasoline motor. In order to meet customer's production requirements of 400 completed pieces



per hour, Ettco Tool & Machine Co., Inc., 596 Johnson Ave., Brooklyn, N.Y. "unit-engineered" this multiple drilling and tapping machine, which consists basically of two of the company's . This allows exact alignment of punch

standard vertical drill units, one vertical automatic lead screw tapping unit and one horizontal drill unit.

These assemblies are mounted on a standard cast iron machine base with built-in coolant tank and pump, Tooling for the part consists of an 8-station index table with eight nests to receive the part.

Use postpaid card. Circle No. 113

Hole locating attachment

The Lo-Ka-Tor simplifies the hole locating problem in sheet metal punching when quantities are very small, such as prototype work, template making, or punching a few pieces from a template. Used in standard punch presses, it locates and punches holes without the use of stops, gages, pins, locating tables.

The one-hand control quickly lowers (or raises) the punch to the workpiece, independent of the ram of the press.





ANGLE BENDING ROLL



Strength. compactness, and extreme versatility best describe this moderate cost.
open and angle bending machine. Will
bend angles, tees, les in
and les out flats on flat
and on edge, also pipe,
tubing, etc. Capacity 2x,
4 angle or equivalent.
Write for details.

HENDLEY & WHITTEMORE CO.

Use postpaid card. Circle No. 444

NOW . . . PORTING TOOLS

AVAILABLE FROM STOCK



A complete line of carbide tipped combination ream, counterbore and facing tools to form AND-10050 standards. Tube sizes 2 through 24 in turnet lathe and drill press types. Special tools made to order.

Send for valuable data sheet

WETMORE TOOL & ENG. CO.
Engineers Designers Manufacture

ers Designers Manufacturers 5318 E. Washington Blvd. Los Angeles 22, Calif. AN 9-7266

Use postpaid card. Circle No. 445



and hole location in the workpiece before tripping the press. When the press
is tripped, the unit automatically
punches the hole, locks the punch for
the upward stroke, and strips the workpiece. Extreme accuracy can be
achieved by using punches with male
centers on the punch faces—the center
can be engaged under manual control,
before tripping the press, directly into
centerpunch marks in the workpiece.

Having made a template repeat pieces can also be quickly made by simply clamping the template on top of each workpiece in turn, and lowering the punch manually as described above into each template hole before tripping the press, using no stops, gages.

The model 183A has a capacity of 0 to 1½" hole in ½" mild steel, or 0 to 2½" hole in 14 ga. mild steel. Available with standard shanks, it fits any press having a stroke not over 3", and having at least 6" of shut height.

Buck Eng. Co., Inc., 31 Marcy St., Freehold, N. J.

Use postpaid card. Circle No. 114

Automatic power feed

Automatic power feed has been added to the Portomag drill press. While the electro magnetic base holds the drill press in position, the new power feed

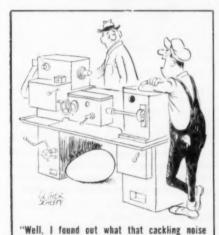


makes it possible for the operator to run the drill point down to the center punch mark, turn on the automatic feed, and let the drill do all the work.

Power feed can be engaged or disengaged at any time during the drilling operation, and the depth of cut per revolution can be set according to the size of drill bit being used. The drill press will drill up to 1¼" and tap 1" holes with accuracy.

Portomag, Inc., Dept. JS, 1511 East Nine Mile Rd., Ferndale 20, Mich.

Use postpaid card, Circle No. 115



SAVE DRILLS!

PRECISION DRILL GRIND-ING BY ANY WORKER!

FOR DRILLS UP TO 3/4"

The BLACK DIAMOND Drill Grinder restores an old drill to like-new precision sharpness . . . in 10 seconds!

Any inexperienced

man (er woman!)
is an expert
grinder with
this unit. Both
lips ground at
once . .
web - thinning equally
simple! Pays
for Itself
many times

overl



The WORCESTER Drill Grinder (now manufactured by Black Diamond) sharpens 2, 3, or 4-lip drills, flat twisted or chucking, up to 2½" Clearances are easily and instantly changeable, feeding is controlled by micrometer adjustment

FREE BULLETIN

Get all the facts! 4 page illustrated bulletin gives complete stary Write Today!



BLACK DIAMOND

SAW & MACHINE WORKS

77 NORTH AVE. NATICK, MASS.

was."

Spin your RIVETS



better and more economically on the NOISELESS

LINLEY

Rivet splaning on the Liniey is a sure way to cut production costs. With Liniey equipment you can easily produce finely flaished rivets even in close places. Send us samples of the work you want riveted, and without obligation we'll show you how it can be done the Liniey-way and what it will east.

Machines available for handling iron and cold rolled steel rivets up to %" and larger size rivets in softer materials.

Send for Bulletin R today.

LINLEY BROTHERS CO.

Also builders of JIG BORERS

673 State St. Ext. Bridgeport 1, Conn.

Use postpaid card. Circle No. 447

SEE SEE



A Boring Head That Won't Face is NOT Complete

NOW you can get a boring head that will BORE, FACE, TURN and GROOVE at no more cost than you would pay for a plain, single purpose boring head.

LOOK INTO THIS before you buy that new head. Write for full details.

CHANDLER TOOL CO. Muncie, Indiana, U.S.A.

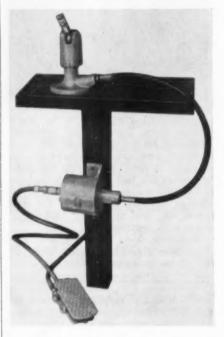
Chandler Duplex

Use postpaid card. Circle No. 448

Automatic work positioner

Model 393 air powered hydraulic PowRarm provides instant positioning of workpieces to any desired angle and leaves both of the operator's hands free.

Complete assembly can be installed quickly on any bench or work station,



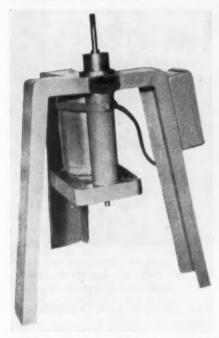
and consists of a work positioner, airhydraulic booster cylinder, foot pedal control, and all necessary hoses and fittings. The hydraulic booster supplies the locking force, and is activated by 60 to 100 psi factory air line pressure.

Work weight capacity is 105 lb. with 100 psi air input, permitting application of the tool to a wide range of electrical and mechanical assembly operations.

Wilton Tool Mfg. Co., Inc., Dept. RB, Schiller Park, Ill.

Profile router

No. 55-P profile router combines the Wallace 10,000-rpm Speed Spindle with a heavy steel stand arranged for maximum freedom of action.



The router was originally developed to provide a fast, flexible and economical means of trimming aluminum alloy formings to exact finished shape, regardless of contour.

The workpiece is clamped to a plastic template which in turn rests against a ball bearing collar on the spindle. A lower support contacts the workpiece to maintain proper height. By holding light pressure against the collar. the operator performs trimming operations free-hand, tilting the work as required to keep the cutter perpendicular to the contour.

J. D. Wallace & Co., Inc., 1013 N. Detroit St., Warsaw, Ind.

Use postuaid card. Circle No. 117



of .0002" run-out. Guaranteed for precision grinding, turnerations.

to heavy castings and forgings. A set of fourteen will fit ing and milling op- every hole from 1/2" to 91/2" diameter.

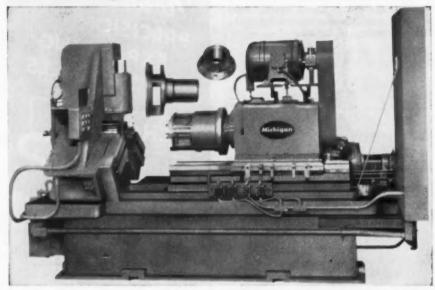
CHAMPION Expanding Mandrels can be made in special shapes and sizes to fit any specifications. Quotations on request. Write for descriptive folder today.

> Certain areas are available for qualified distributors.

MFG. CO., INC

Springfield OHIO

Gun Drilling Machine



This gun driller drills six holes in a carrier gear: to size, within .005; to location, within .001. It produces 400 parts in an eight hour shift. No further operations are required.

Machine is built to handle three totally different parts. The diameter of the largest part, 12"; diameter of smallest part, 6". It can be converted to handle one part or another in three minutes. Gun driller will handle doubletlanged parts, too. Michigan Drill Head Co., P.O. Box 4643, Detroit 34, Mich.

Use postpaid eard, Circle No. 118

Tap driver line expanded

Three new styles have been added to the line of Safe-Torque tap drivers: tension and compression type, quickchange type, and heavy-duty type.

An overrunning roller drive design releases instantly when preset torque





is reached. The drive consists of a drive shell, single or double set of rollers, and inner cam drive collet. Torque is transmitted when the rollers are wedged between the drive shell and raised cams on the drive collet. All parts deform elastically when rollers climb into the wedging position.

When torque reaches the setting, the rollers roll past the high points on the cam and are locked in a free position. In the freewheeling position, no torque is transmitted from drive to tap and the driver continues to rotate on antifriction ball bearings. The freewheeling action permits operator to bottom-tap at high speeds without breaking taps.

Tension and compression type tap drivers compensate for variations in feed between spindle and tap and release at preset torque rating when the hole is tapped. The tap floats in and out of the hole without overcutting or un-



WATTS BROS. TOOL WORKS Wilmerding, Pa.

Use postpaid card. Circle No. 451



choose a
DISSTON!"

LANCER TOOTH—Hard edge blade with positive rake angle tooth. Permits high-speed production cutting of non-ferrous metal, wood and plastic. Cuts brass and aluminum solids and Plexiglas with equal ease.

REGULAR TOOTH—Hard edge flexible back band saw with finer tooth spacing. Cuts all ferrous metals and thinner sections of non-ferrous metal and plastic. Excellent for sawing angle iron, steel tubing, nickel plate and brass sheets.



For information-packed booklet on Metal Cutting Band Saws, write to Dept. 49, Henry Disston Division, H. K. Porter Company, Inc., Philadelphia 35, Pa.

DISSTON-HKP

READING BENCH KEYSEATER

Portable directly to job; a time saver for both small and large shops. 33/4" stroke; adaptable for other work. Low first cost. prompt delivery.



Use postpaid card. Circle No. 453

economically priced press room equipment



DURANT Ram Scrap Chopper

Operated by press ram, independent of the die; tool steel blades - only two bolts to install.

FOUR MODELS MI up to 3" width up to 10" width and .062 thickness and .100" thickness

up to 12" width up to 6" width and .062 thickness and .100 thickness

WRITE FOR NEW FREE CATALOG PROVIDENCE 3, RHODE ISLAND

Use postpoid card, Circle No. 454

dercutting the flanks of the thread. When bottoming in a blind hole, the tension and compression feature cushions the shock and enables the tap to jump away from the last thread when being withdrawn. Two sizes offered range from No. 10 to 5% in.: torque ranges from 50 to 700 lb. in.

Quick-change type tap drivers permit tool change without stopping the machine, thus speeding sequence operations involving drilling, reaming, and tapping. They are also shorter and have a smaller diameter than other drivers of the same capacity. Three sizes are available for tap range from No. 10 to 1 in. Torque range is from 40 to 1900 lb. in.

Heavy-duty type tap drivers featuring the rugged double roller design provide quick and easy adjustment in addition to constant torque setting even on the toughest jobs. Two sizes cover tap range from 1/2 to 11/2 in. and torque range from 500 to 2400 lb. in.

Scully-Jones & Co., Dept. HS, 1901 S. Rockwell St., Chicago 8, Ill.

Use postpaid card. Circle No. 119

Impact wrench

This impact wrench weighs 7 lb. and delivers 1800 high-intensity impacts per minute: cannot be stalled or overloaded. Its power output is identical for either forward or reverse. Centrifugal fan and

ACCURACY Heavy Cuts with

ADJUSTABLE CARBIDE and CERAMIC TOOL HOLDER .Accurate .Quick Set-up .No Shims .Heavy Cuts .Tool Steel Construction

No. 25 up to 1/2" Tool for lathes up to 14" \$49.50 No.50 up to 1 1/4" Tool for lathes over 14" \$69.50

MADISON TOOL & SUPPLY

801 Bond Street, Elizabeth, N.J.



Made in U.S.A



ventilating system give tool a cool operating temperature at all times. It reaches its maximum torque in six seconds.

The Black & Decker Mfg. Co., Towson 4, Md.

Use postpaid card. Circle No. 121



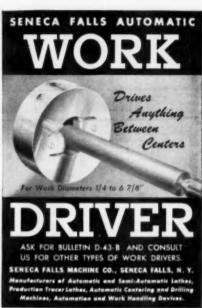


MANUFACTURERS OF ALL AMERICAN

VIBRATION FATIGUE TEST MACHINES

Use postpoid card. Circle No. 456

Use postpoid card. Circle No. 456



Use postpaid card. Circle No. 457





IN STOCK FOR IMMEDIATE SHIPMENT

All Tools Sold On A Money Back Guarantee



HIGH SPEED RIGHT HAND TAPS

SIZE	THREAD
4	32-48-60-64
8	30-32-36-48-80
7	36-40-48-56-80 32-40-48
	24-30-36-38-
-	40-44-48
9	24-28-32-40-48
10	28-30-36-40-48-64
12	20-25-32-36-48
1/16	20-24-28 60-64
8/64	36-48-72
3/32	48-56-60
7/84	48-56-60
1/8	32-40
5/32	32-36-40-48
9/64	86-40-48
11/64	36
3/16	29-24-32
13/64	32-36-48
7/32	24-26-32
1/4	18-24-26-27- 30-32-36-40-48
5/16	16-20-22-27-
	28-32-36-40
3/8	12-16-18-20-27-28-32-
7/16	12-16-18-22-24-27-28-
1/2	12-14-16-18-22-24-26- 27-28-30-32-36-40
9/18	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32- 36-40
11/16	11-16-18-20-24-27-28-30-32
8/4	9-11-12-14-18-20-24-26- 27-28-32
13/16	10-14-18-20-27-32
7/8	18-12-16-18-20-24-27-28-32
18/16	8-9-10-12-14-16-18-20-24-32
	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-8/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-28-24-28
1-9/16	18-20-24-36 51/2-8-18-12-13-16-18-20-24
1-8/8	10-12-14-18-18-20-24
1-11/16	10-12-14-10-10-20-24

THREAD	SIZE	THREAD
8-10-12-14-	2-1/4	41/2-8-12-
8-10-12-14-	2-5/18	12-18
8-10-12-14-	2-1/2	8-10-12
8-10-12-14-	2-5/8	12-16-28
41/2-8-10-	2-7/8	8-12-16
12-14	3-1/4	8-16
12-16-20	3-1/2	8-12-16 6 8-12
	8-10-12-14- 10-18-20-24 18-10-12-14- 16-18-20 8-10-12-14- 16-18-20-24 16-18-20-24-28 4/x-8-10- 12-16-18-20 12-14- 12-16-18-20	8-10-12-14- 2-1/4 16-18-20-24 16-18-20 2-3/8 16-18-20 2-3/8 16-18-20 2-3/8 16-18-20-24 2-9/16 16-18-20-24-28 2-3/4 4/y-8-10- 2-7/8 12-16-18-20 3 12-14 3-1/4 12-6-20 3-1/2

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD	SIZE	THREAD
	80	11/16	11-16-24
ï	56-64-72	3/4	10-16-18-26
2	55-64	13/16	16
3	56	7/8	9-12-14-18-20
4 5 6 8	32-36-40-48	1	8-12-14-16-18-20
5	40-44	1-1/8	7-12
6	32-36-40	1-1/4	7-12-16-18
8	32-36-40	1-3/8	6-8-10-12-16-18-
10	24-30-32-40		20.24
12	24-28-32	1-7/16	8-10-12-14-18-18-20
1/4	20-28-32	1-1/2	6-8-10-12-16-18-20
5/16	18-20-24	1-9/16	8-10-12-16-18-20
	28-32	1-5/8	8-10-12-14-16-18-29
3/8	16-24-32	1-11/16	8-10-12-14-16-18-20
7/16	14-20-28	1-3/4	8-10-12-14-16-18-20
1/2	12-13-20-28	1-13/16	8-10-12-14-16-18-20
9/16	12-18-20-24	1-7/8	8-10-12-14-16-18-20
5/8	11-12-18-	1-15/16	H-10-12-14-16-18-20
	20-24	2	41/2-10-12

LEFT HAND AND SPECIAL DIES IN STOCK

PRICES ON APPLICATION. NEW SIZES
ADDED FREQUENTLY

NOTE: Oversize — Undersize — and ACME Taps available.
H. S. Extension drills—Special Reamers and Special

Twe days delivery on all sizes not listed herein.

We will allow you full credit on your surplus and obsolete tools. Write for particulars

SPECIAL PRICES ON REGULAR TOOLS. Send for Catalog.

WESTERN TOOL SUPPLY COMPANY

617-19 W. Randolph St., Chicago 6, III. PHONE: RAndolph 6-4113

Designed for TOOL ROOM EFFICIENCY

HUPPERT Heat Treating FURNACE

Range: 300° F. to 2000° F.

Years of satisfactory operation in tool, die and machine shops, as well as laboratories have proven these furnaces to be ideal for production work. Huppert special features include High Temperature, Heavy Duty Kanthal elements-Multi-insulation-counterweighted and tight self-sealing door. Pilot lights indicate furnace operation. All connections factory installed, shipped ready for operation.

Model No.	Inside Dimensions			Prices 220 volt single phase				
	Wide	High	Deep	KW	with Huppert input controller	with electronic temperature controller		
869	69 8" 6"		9"	4	\$280.00	\$480.00		
11	8"	6"	12"	4	298.00	506.00		
12*	8"	8"	12"	6	382.00	590.00		
12A*	8"	8"	18"	9	490.00	698,00		

*For 2300° F. add \$95.00 to No. 12 and \$105.00 to No. 12A. No. 12A can be furnished for 3 phase at no additional cost. For floor model add \$52.00 to above prices.

 Write for literature on complete line of furnaces and ovens. Ask for Hints on Heat Treeting.

K. H. HUPPERT CO.

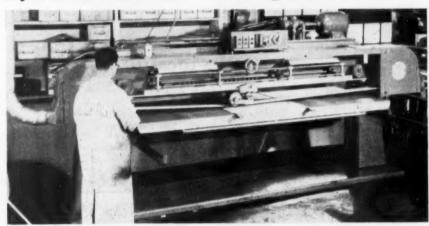
6845 Cottage Grove Avenue

Chicago 37, Illinois

Manufacturers of Electric Furnaces and Ovens

Use postpaid card. Circle No. 460

Hydraulic Automatic Polishing Machine



A stainless steel fabricator whosematic stroke polisher to polish either use the Model 43-R3 hydraulic auto- better. The poli her employs an hydrau-

production does not warrant the pur-chase of a wide belt sheet polisher may 2B roll mill sheets or formed flat sur-faces to an equivalent No. 4 finish or

lic system which powers a traveling head at 80-90 eight foot strokes per minute, with longer strokes possible. A buff roll mounted on the traveling head backs up the 6" wide abrasive belt with a soft pressure that gives a uniform finish. The stock table reciprocates under the belt with grind pressure, either by manual or air pressure control. The scratch pattern created is longer than mill-furnished standard No.

3 or No. 4 finishes, but more approximates the final finish which a fabricator ships on his product. The hydraulic automatic finish is easier to simulate by hand as it is close to the final finish. With the weld removal and blending operations required, the true No. 4 finish would be lost as it cannot be duplicated by hand.

Polisher can be built to accommodate any length or width capacity. It can



Lecalites are available through wholesalers everywhere

INCREASE PRODUCTION...



Above is shown a 6M Fen Automatic Wrench operating a 28" heavy duty chuck.

ELIMINATE "WRENCH WRESTLING"

You can put the advantages of the Fen Automatic Wrenches to your work right in your own shop on machines already in operation, or specify them on your new standard or automatic machines.

For detailed information regarding the application of the Fen Automatic Wrench to your machines, phone, wire or write. THE FEN
MACHINE COMPANY
28914 Lakeland Blvd.
Wickliffe, Ohio

Use postpaid card. Circle No. 462

also be used for weld removal, surface cleaning prior to painting, scale removal, filler sanding.

Curtis Machine Div., The Carborundum Co., Dept. RH, Jamestown, N.Y.

Use postpaid card, Circle No. 122

Sequence timer-recorder

A timing-recording instrument, the "Monitorecord," is designed for split-second monitoring of multi-operational automatic machinery. Up to fourteen operating sequences can be simultaneously timed to within one hundredth of a second and recorded on a strip chart for ready visual reference. The instrument is about the size of a portable radio.

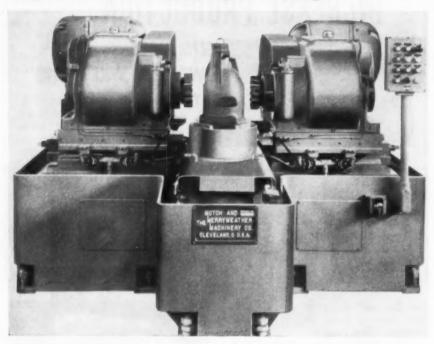
It can be plugged into the electrical control circuit without shutting the machine down, and no other external power supply is required. The start, stop and duration times of the various sequences are timed and recorded on a five inch chart of pressure sensitive



paper. A handy time scale of .2 seconds to the inch is marked on both sides of the chart, and there is ample space between lines for making notations.

Autometrology Div., Sheffield Corp., Dept. JS, Dayton 1, O.

Duplex Mill for Quadruple Milling



Transmission housings are milled, two sides each, simultaneously, by opposed milling heads on this rugged machine. The work is located on the large end surface through the locating holes. At the first pass two bosses are milled on two sides, the bottom bosses being

close to the bottom edge of the casting on each side. For the second pass, and the milling of bearing surfaces on each side, the locating fixture turns 90 degrees, and drops the work about one inch so as to clear projecting lugs from the path of the cutters. In this

IMPROVED MACHINE TOOL VISES



QUICK ACTION VISE (Size No. 7)
For drill press or milling machine. Designed for production work, using eccentric motion to apply pressure to jaws. Eccentric parts hardened to insure long life. 6" jaws. 1%" deep, open 4". Price \$101.00

SHAPER VISE with Graduated Square Swivel Base (Size Ne's, 4 & 40)
Base is graduated and has tongue in center to fit slot in table. Also
holds for holding down.
Size No. 4---6" jaws. 1½" deep, opens 5", Price 399.50,
Size No. 40--10" jaws 2½" deep, opens 8½". Price \$135.00.

Size No. 40-10" jaws 24" deep. opens 84". Price \$135.00.

Dealers' inquiries invited—All Prices Net F.O.B. Chicago.

Write for descriptive literature

J. E. PLUNKET MACHINE CO. 3230 ARCHER AVE.

second position, the cutters mill the bearing surfaces and machine the top surfaces of the lugs. For this pass, the heads also must advance because the work is narrower.

All movements are automatic, hydraulically actuated. The milling heads are universal, with changeable speeds and with a two-inch quill adjustment. The Motch & Merryweather Machinery Co., Dept. RH, 888 East 70th St., Cleveland 3, O.

Use postpaid card. Circle No. 124

JIG BORING

and

Large Precision Machining
Done to your specifications
WE HAVE 21 JIG BORERS

KIDDE PRECISION TOOL CORP.
25 LOCUST AVE. ROSELAND, N.J.

Use postpaid card. Circle No. 464

NEW BRITAIN SWIVEL VISE



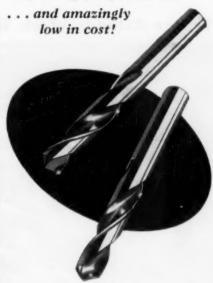
The body is made of semi-steel; the jaws of tool steel hardened and ground. All working surfaces are ground. The vise is as accurate as is possible and the degrees are cut to very close limits.

Write for further information

NEW BRITAIN TOOL & MFG. CO.

13 HARVARD STREET NEW BRITAIN, CONN., U.S.A.

Use postpaid card. Circle No. 465 February, 1957 They're tough, they're versatile



ACE

STUB DRILLS

The short, heavy duty flutes of Ace Stub Drills are ground into top quality pre-hardened high speed steel to give you keener cutting lips, extra strength, longer drill life. Ideal for close-to-work screw machine operations and portable drilling. And they're now stocked in 140 standard sizes that cost approximately 20% less than equivalent jobber length drills!

Call your local Ace Drill Distributor today!

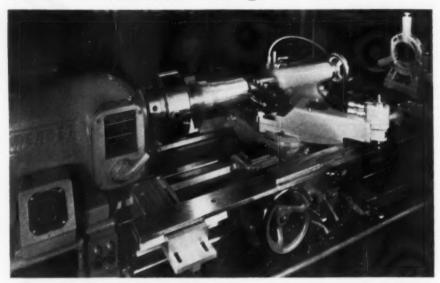


ACE DRILL

ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

Tracer Extends Work Range of Lathe



CAMS

To Your Specifications except Screw Machine Cams

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

Use postpaid card. Circle No. 467

This hydraulic tracer attachment adapts the No. 2E general purpose lathe to production turning jobs. Since the tracer unit comes as a complete package with the pump and sump mounted on the floor at the rear of the machine there are no additional external plumbing connections required.

Mounting of the tracer is simple, requires no drilling or tapping of holes for either the tracer attachment or the template bracket. Attachment replaces



FACING HEADS

with Automatic Feed

One-way Tool Feed—6, 9 and 12" sizes.

Two-way Tool Feed—9, 12, 16, 20, 24, 30, 36, 40 and 46" sizes. Save many costly set-ups. Bulletin No. 4141 Gives Full Details

MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.

the standard compound and is held in place by the two compound bolts. Two additional bolts hold down the template holding bracket, one at each end. A flat template is used for all production turning operations with the template being mounted at the front of the machine.

The combination of tracer turning and the stepless speed control that is a feature of the No. 2E lathe is claimed to assure the machining job will be done at the right speed and feed to give excellent surface finish.

The ability to change speeds even when the spindle is under load enables the machine to turn at virtually constant surface speed since the operator has an infinitely variable electronic drive from 15 to 1500 rpm at his fingertips. Dynamic brake assures fast stopping and reversing of the spindle.

Driving the lathe is a five hp 230 volt dc variable speed motor. Power for the motor is provided by the rectifiers in the electronic panel which convert 3 phase, 60 cycle alternating current to direct current.

Hendey Machine Div., Barber-Colman Co., Dept. RB, Rockford, Ill.

Use postpaid eard. Circle No. 125

Optical torque tester

This precision torque tester features a torsional shaft measuring element that is submerged in pre-heated oil, which assures constant operating temperatures



Use postpaid card, Circle No. 469

for the measuring device. There is no mechanical connection between the measuring element and the indicating pointer, as the pointer is projected onto the scale through an optic system. The indicating pointer, as it appears on the television-type screen, travels across a ribbon scale for a distance in excess of ten feet in total length. The indicating pointer is a shadow image, and therefore there is no parallax error when an operator views the screen. Correct read-

THE CURVIT 145



An unusual Metal Forming Machine designed to put uniform curves in strips, bars and tubes.

Photograph shows one-half inch square steel being formed into coils, finished coil in foreground.

The CURVIT 145 is one of a complete line of Metal Forming Machines made by

KILHAM ENGINEERING INC.

R.F.D. NORTH ATTLEBORO
MASSACHUSETTS

MYrtle 5-6211



ings can be made from either side, as well as from a perpendicular view.

Power loading device eliminates hand loading. A torque wrench can be tested to full capacity in seconds. The loading arm is operated by an air-draulic system; movement can be controlled with a metering valve so that it will move slowly or rapidly.

The P. A. Sturtevant Co., Addison,

Use postpaid card. Circle No. 126

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and



you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to 3/4" U.S.S. Inexpensive — Last for years.

Write for Circular
NIELSEN TOOL &

17360 Lahser Rd. Detroit, Michigan

Use postpaid card, Circle No. 471

FLANGING MACHINES

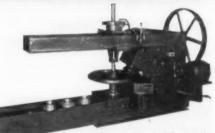
No. 1 10 gauge capacity combination eircle shear and flanger; from 14" to 6" diameter flat with support; 12" diameter loca support.

No. 3 "4" capacity flanging flat heads from 18" to 12".

No. 4 %" capacity flanging flat heads 20" to 12"; also handles standard dished heads up to 12" dia.

No. 5 $\frac{1}{2}$ capacity flanging flat heads 24 to 20; also handles dished heads up to 12 dia.

No. 6 Na' capacity for flanging flat heads 28' to 20'; also handles dished heads up to 12' dia.



Above machine a Ne. 4-% capacity. With $\frac{1}{2}$ bead, 26 diameter. Will flange flat heads from 20 to 12 ft. in all thicknesses up to and including $\frac{1}{2}$ belier plate. Dished head attachments can be furnished with this model.

No. 53 Elliptical Hoad Shear and Flanging Machine sheared to size and shaps before flanging from same template without removing work from the machine.

BLUE VALLEY MACHINE & MFG. CO.

Stub arbor for milling machines

It is possible to adapt side milling, corner rounding, concave and convex cutters to a Peterson stub arbor flush, adding versatility to milling mach nes, both vertical and horizontal. Tool permits milling cutters to make a full cut across a flat surface—to a closer tolerance, better finish.

The use of angular cutters (right, left or included) is practical beyond the dove-tail cutter range mounted flush on the stub arbor. It is manufactured in a variety of tapers to fit most milling machines, will accommodate cutters with either 1" or 11/4" arbor hole, from 1/4" cutting face up to and including 3/4", and from 3" to 6" diameter. The cutters are key driven and held in position by the use of a half-split bushing and a flush tightening screw, avoiding protruding nut.

Hardened and ground spacers are supplied with each stub arbor, per-



mitting cutters of various widths to be adapted flush. Arkor reduces tooling cost and is the answer to many production m lling problems, the manufacturer claims.

S.erra Machine Co., Inc., Dept. HS, 80 E. Jackson Blvd., Chicago 4, Ill.



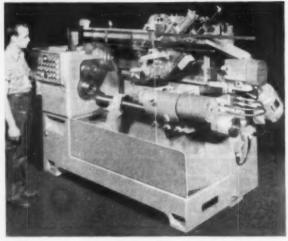
MILWAUKEE 14, WIS.

Multi-Cycle Tracer Lathe

Only one template. easily accessible on the front of the machine, is required for multi-cycle cuts with the Model 14T tracer lathe. Two roughing cuts, a semi-finish, and finish cut may be obtained in one automatic cycle. An indexing tool turret permits the use of two cutting tools, one for roughing and one for finishing. Shoulder facing tools can be provided for squaring operations, etc.

Stylus, template and workpiece are in full view. Front loading

lends itself to easy handling, and is suited for automatic handling mecha-



nism. With the tracer controls and stylus on the top carriage, chips and

NEW 25° Tilting Spindle

makes set-ups easier on the STERLING "G-2"
Tool & Cutter Grinder

Direct, positive clearance angle setting, without formulas, saves set-up time, assures accurate grinding. Extra capacity (10 ¾" swing), complete flexibility and rugged construction give the Sterling "G-2" maximum versatility. Available in plain and universal models. Write for details and low prices.

McDONOUGH MANUFACTURING CO.

1524 GALLOWAY, EAU CLAIRE, WISCONSIN

dirt will not accumulate on the template and impair machining accuracy.

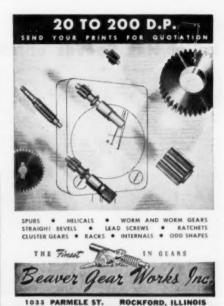
The transmission-type head is available in a two, four, or eight speed type. Automatic speed changes are provided for all cuts of a cycle with each type head. The proper spindle speed for the best surface finish and feed are automatically maintained at all times.

Sundstrand Machine Tool Co., Dept. RB. Rockford, Ill.

Use postpaid eard. Circle No. 128

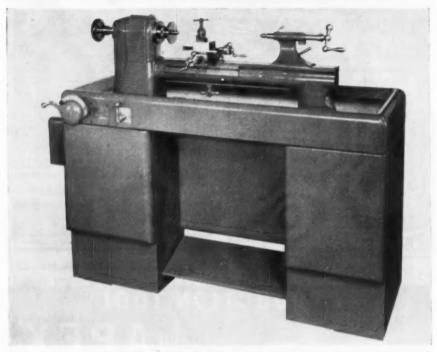


Use postpaid card. Circle No. 475





Lathe Has Speeds of 288-4000 RPM



The Series 400 lathe takes 5C collets having 1" capacity. Infinitely variable speeds range from 288 to 4000 rpm. The speed changes are actuated from a remote control located most favorably for

instant use. Ball bearing spindle is preloaded and the tolerance is .0001" at the spindle mouth. Swing is 9", bed length 40". Stark Tool Co., Dept. DR, P.O. Box 22, Maynard, Mass.

Use postpaid card, Circle No. 129



SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists & tool cribs

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel-Carefully heat treated and tempered for long life-.0025 undersize to facilitate use-Black axide finish. SET #3-17; 28 punches with indexed stand—sizes 3/32" to ½", by 1/64"—
plus handy 17/64" size. Length 47/8". ONLY \$17.90.
Single sizes available

R. L. SPELLMAN CO.

URBANA, OHIO

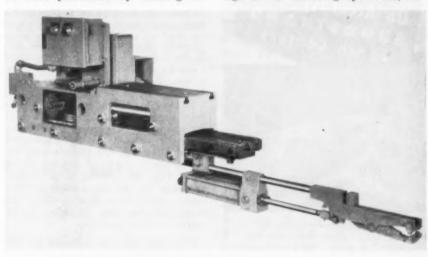
Use postpaid card. Circle No. 478

MACHINE and TOOL BLUE BOOK

Automatic Press Unloader

The Sesco automatic press unloader increases production by utilizing the

full capacity of the press, provides savings in the unloading operations, im-





VOGEL

TOOL AND DIE CORPORATION 1825 North 32nd Avenue Melrose Park, Illinois





Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

"One-hand control" over all movable elements leaves the operator's other hand free to control rotation of the part being checked. Either headstock or tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever. Investigate this bench center today.

Complete Range as Follows:

6"	×	18"	12"	×	48"	24"	×	48"
6"	×	36"	12"	×	60"	24"	×	60"
12"	×	36"	12"	×	72"	24"	×	72"

FREE Additional Data



covering complete specifications and additional features is contained in this bulletin. Write for your copy. Ask for data sheet 476

SUNDSTRAND MACHINE TOOL CO.
2535 Eleventh Street, Rockford, III., U.S.A.

proves safety conditions by reducing unloading accidents, reduces production costs.

Unit is self-contained except for the limit switch mounted on the press. No floor structure is required.

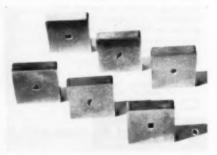
Synchronized with the press, the unloader is operated by two air cylinders -a main cylinder, or lift cylinder, and a jaw cylinder for opening and closing the jaws. When the press signals that it is clear for unloading, the jaw cylinder moves the open jaw forward. At the end of the forward stroke, the jaw grips the part. At this point the main cylinder retracts, lifts the stamping out of the die, and swings it clear of the press. The jaw cylinder then retracts, unclamps the part on a table or convevor, and trips a limit switch. The main cylinder then returns to its normal waiting position.

Unloaders may be obtained in five standard sizes to meet most unloading conditions. Jaw widths are adjustable for different width parts, for different loading heights, and for the angle of travel into the die. Sesco Inc., Dept. JS, 8881 Central Ave., Detroit 4, Mich.

Use postpaid card, Circle No. 130

Throw-away blanks identified

A permanent system of identification on cemented tungsten carbide throw-



away blanks helps eliminate high tool costs due to the mixing of various grades. It also simplifies taking of inventory on the blanks.

Carmet Div. of Allegheny Ludlum Steel Corp., Pittsburgh 22, Pa., makes throw-aways in six grades in the form of circles, squares, and triangles. They press the designation 1/64 of an inch deep into the face of the blank. The designations are: square, Grade CA-4; semi-circle, CA-605; triangle, CA-606; circle, CA-608; diamond, CA-609; rectangle, 6A, 610.

Use postpaid card. Circle No. 131

Die spring assortment

Die spring assortment No. 40 contains forty different wire sizes in eight spring diameters ranging from 3/32"



to $\frac{1}{2}$ ". Springs are of 10" lengths, with open ends.

Refill packages of 12 springs of a size are also available. In sizes up to .075", springs are wound from music wire. Sizes .075" and larger are carbon steel.

The Producto Machine Co., 990 Housatonic Ave., Bridgeport 1, Conn.

Use postpaid card, Circle No. 132

<u>L</u>ASSY

MASTER V-BLOCK

ANGLE PLATES

Proven Time Savers!

A Master tool of versatility for every day use in . . . inspection and machining operations.

This Master V-Block Angle Plate is an improved new design. Saves hours of setup time. Assures precise work accuracy. Reogires less skill.



Side Gage automatically squares work precisely and without removing angle plate from chuck. Repetitive accuracy maintained.



Adjustable parallel holds the smallest work for position and clamping with ease and accuracy



LASSY MASTER Angle Plate also provides a master setup for regrinding of worn or inaccurate Angle Plates.



The LASSY MASTER Angle Plate is an indispensable tool precisely accurate and dependable.

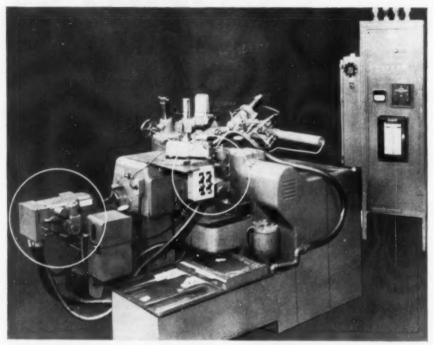
WRITE FOR ILLUSTRATED LITERATURE



COMPANY

PLAINVILLE, CONN.
Use postpoid cord. Circle No. 481

Automatic Gage and Feed System



An electronic automatic gage and feed system, the Size-O-Tron, utilizes the feed-back principle as it automatically gages the parts being ground, automatically adjusts the grinder to compensate for wheel wear and automatically records the size. The finished

work is continuously gaged as it emerges from the machine and the information from the gaging unit is fed back to the machine, automatically adjusting for wheel wear and all other variables that effect size changes.

One operator can run several ma-



chines, operating at full speed; manual gaging is virtually eliminated.

Should the parts being ground deviate more than 10 millionths of an inch from the desired size, the electronic controls detect the trend and start to correct the condition. If some condition arises which is beyond the ability of the Size-O-Tron to correct, the automatic controls stop the grinder immediately and a red warning light shows that attention is required.

Attached to a conventional centerless grinder, the unit is capable of maintaining a tolerance or spread of .000050" disregarding the inherent inaccuracies of the machine. If the variation within the machine does not exceed .000050", a total tolerance of .0001"

can be maintained. A practical total tolerance with a well maintained machine on the production line is .000150". Kaydon Engineering Corp., Dept. JS, McCracken St., Muskegon, Mich.

Use postpaid card, Circle No. 133



NOW...
you can
CONVERT
LATHES FOR
MILLING

in 10 seconds with the PALMGREN

Now, in your own shop,

on your present lathes, you can do such jobs as Milling, Slotting, Grinding, Grooving, Sawing

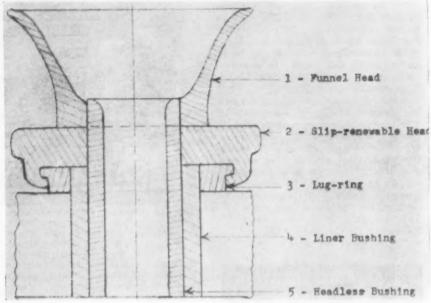
at angles, recessing and many more complicated jobs easily and quickly with the Palmgren Milling Attachment. Yes, in just 10 seconds you can convert to any of these operations and save time and money doing work you formerly had to send out. Precision built, graduated for rotary angle and vertical adjustments, easily mounted on all makes of lathes by straddling tool post, this attachment has proved highly valuable in thousands of shops, both large and small. Three sizes: jaw widths 11/2" \$18.75; 21/2" \$24.75; 4" \$39.75. Available NOW! Get more out of your lathes by using these Palmgren Milling attachments. Write today.

Just a few operations you can do on your lathe!



CHICAGO TOOL & ENGINEERING CO.
8384 South Chicago Ave., Chicago 17, Illinois

Plastic Head Drill Jig Bushing



Reduced bushing cost is claimed for users of a new drill jig bushing which has a plastic head. Coolant or cutting oil is retained where needed, for better finish, longer tool edge life.

Only headless bushings are used, plus desired head or heads. This reduces inventory and eliminates mistakes in ordering. Easier and faster changing of bushings is claimed, because of better grip and the fact that the slip-renewable head fits the lug ring in any position. (Like the top of a screw-type jar.)

Color coding becomes automatic. "Put the red drill in the red hole." Associated Industrial Design & Engineering Inc., Dept. RB, 2703 Lathrop Ave., Racine, Wis.

Use postpaid card. Circle No. 134

ALEXANDER deep throat engraver

does

Precise, two-dimensional work. It handles workpieces up to 10'' high, 38'' wide, on a worktable $20 \times 8''$; optional auxiliary table $18 \times 24''$. Ratios—1:1 to 1:50. Spindle has fine and coarse feed adjustments. Cutters up to 1/4'' dia. Speeds—2800 to 15,000 rpm. 1/4 hp motor.

Write for outalog

J. ARTHUR DEAKIN & SON 150-28 Hillside Ave., Jamaica 32, N.Y.



Abrasive spheres

Tumblex S abrasive spheres come in five different diameters and are made of Alundum aluminum oxide abrasive.



They are suited for barrel finishing hard-to-contact recesses or intricate shapes: tubing, coil springs, scissor handles, bearing retainers, pump bodies, etc. Spheres are dense and long lasting.

Manufacturers with parts which may be suitable for finishing with the new abrasive spheres may send samples to the sample processing laboratory, Dept. DL, Norton Co., Worcester 6, Mass.

Use postpaid card, Circle No. 135

Concentricity attachment

An attachment to be used in conjunction with the Bryant B-21 bench gage is used to check concentricity of small internal conical surfaces in relation to a thread on aircraft parts and similar workpieces.

Checking is done by a pivoted pin follower which contacts the conical surface and transmits any eccentricities



GEARS

In Stock—Immediate Delivery

Gears, speed reducers, spreekets, thrust bearings, flexible couplings, pulleys, ets. A semplete line is carried in our Chicage stock. Can also quete on special gears of any kind. Sand in your blueprints and inquiries.

Send for Complete Catalog No. 18
CHICAGO GEAR WORKS
440-50 N. Oakley Blvd., Chicago 12, III.

Use postpaid card. Circle No. 487

February, 1957

FOR LOWER COST HIGHER QUALITY WESTBURY VERTICAL MILLS Models 1-5 and 1-R



Hardened and ground high-speed ball bearing spindle—5" quill travel, micrometer depth stop—Three feeds, .0016; .003; .005—Rapid spindle change over, 8 speeds (80-2713) — Dovetailed overarm (1-S)—Raund over-arm, (1-R)—Precision angle setting control — Rigidly mounted table—42¾" x 9½" — 30" longitudinal range, 10" transverse, 16" vertical—Positive locks—Motor, 1.5 H.P. — Weight, 2200 lbs. Available with duplicating attachment Mod. FR for hydraulic precision reproduction of molds, patterns, and templates in any material.

Write, wire or phone for descriptive literature



Distributors in principal cities

MASĒRATI

Maserati Corporation of America Westbury, L. J., N.Y.

Use postpoid card. Circle No. 486

337



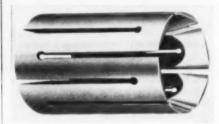
of the surface to a dial indicator. A ball slide follower is incorporated into the concentricity attachment to compensate for thread progression and to allow checking the conical surface through one or more full turns of the work part. The size of the internal thread is also checked at the same time.

Bryant Gage & Spindle Div., Dept. DL. Box 620, Springfield, Vt.

Use postpaid card. Circle No. 136

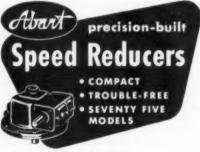
Collet arbor

The "Tork-Lok" collet arbor line has been expanded to include sizes above 2-9/16"—four additional arbors in each of the three styles (between centers,





Use postpaid card. Circle No. 488



ADU UNIT RATIOS: 4 5/6 TO 100 to 1

Abart Speed Reducers are precision built to provide efficient, power conserving speed reduction and are available in a wide range of models to meet your specific requirements.

Supplied in worm, spur and combination gears—single or double reduction. Ratios from 4 5/6 up to 10,000 to 1. Ratings from 1/20 to 400 hp. depending on type unit.

Write today for Abart's free data-packed, pocket-size speed reducer catalog.

ABART GEAR and MACHINE CO.

4829 WEST 16th STREET

CHICAGO SE, ILLINOIS

Use postpaid card. Circle No. 489

MACHINE and TOOL BLUE BOOK

flange-mounted draw bar, and air operated). To effect the range from 2-9/16" to 6-1/4", 120 collets have been added. The range between 1/4" and 1/2" will be released soon.

N. A. Woodworth Co., Dept. JS, 1300 E. Nine Mile Rd., Detroit 20, Mich.

Use postpaid card. Circle No. 137

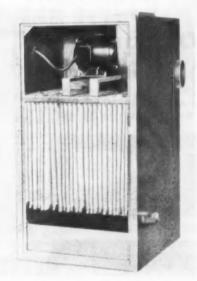
Storage capacity of dust collectors boosted

Torit Series 80 cabinet cloth-filter dust collectors have been redesigned to permit over 2½ times more dust storage capacity, from ¾ cu. ft. to 2 cu. ft. for each model.

Filters are made from fine-woven cotton, chemically treated for spark resistance; cabinet measures $49\frac{1}{4}$ " x $28\frac{1}{4}$ " x 28". Internally mounted motors and fans move from 580 to 1100 cfm of air through the filters at speeds of 5000 to 8000 fpm.

Torit Mfg. Co., Dept RB, 287 Walnut St., St. Paul 2, Minn.

Use postpaid card, Circle No. 138



DO YOU MAKE?

- Plastic, Rubber or Glass Molds
- Forging or Die Cast Dies
- Contoured Parts for Ordnance



Now 2 Major Improvements on the Fluid Motion

REGENT DUPLICATOR

NEW . . . ADJUSTABLE FRICTION BRAKE

For <u>Selective</u> Table Sensitivity

NEW . . . CIRCULAR
BALL BEARING RACEWAYS
For Even Smoother Table Movement

MOUNTS IN MINUTES ON YOUR BRIDGEPORT AND CINCINNATI TOOLMASTER MILLS

Capacity 6" x 6" — 1 to 1 ratio with master. 2 or 3 dimensional with greatest accuracy. Single lever table control. Table "floats" on precision balls.

J. M. KALINS & CO. 1575 Railroad Ave., Bridgeport, Conn.

Double universal joints for slow speed use

Double universal joints for slow speed applications up to 300 rpm. are available in 13 standard sizes to provide a horsepower range from ½ to 207 at 100 rpm., static torque from 340 to 130, 700 in-lb. Maximum operating angle is 90°.

Joints are either solid or bored, with hub diameters from 1/2" to 4". Standard



lengths run from 4" to 21¼". Forks are precision ground concentric to .001". Pins are oil-hardened drill rods. They are ground to .0005 tolerances. Lovejoy Flexible Coupling Co., Dept. MEW, 4800 W. Lake St., Chicago 44, Ill.

Use postpaid eard, Circle No. 139



THE \$20,000 DELAY

For want of a simple nameplate, the Automatic Temperature Control Co., Philadelphia, had to hold up shipment of \$20,000 in control equipment.

Now, a portable Engravograph (size of a typewriter) makes individual nameplates on the premises. Cost, per label, less than 50¢—with unskilled labor.



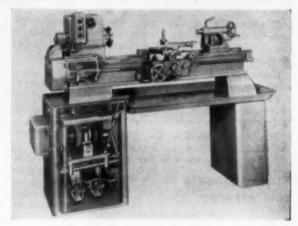
Lathes Have Heavy Duty Variable Speed Drive

A new series of 11" and 13" swing lathes has spindle speeds from 40 to 1800 rpm. Speed changes are made visually and instantly by raising or lowering a T-handle speed selector lever. Actual spindle speeds are read on the large tachometer dial built into the headstock.

Only 9 seconds are required to change from low to high speeds in either direct drive or back-gear. The spindle speed range is 200 rpm to 1800 rpm in direct

drive and 40 rpm to 300 rpm in back gear.

In operation the operator raises or lowers the selector handle (depending



on whether he wants a higher or lower speed) and releases the handle when the tachometer dial indicates the exact spindle speed desired. For certain pro-

KUTMORE ADJUSTABLE

A MIGHTY MIDGET!

This Midget Floating Holder Hollow Mill, flange type, has micrometric adjustment, and is designed to permit easy compensation for any spindle misalignment. Small, sturdy, extremely accurate!

WRITE TODAY FOR Catalogue No. 20-BB

It shows complete line of adjustable hollow mills. Our Engineering Dept. is at your disposal for special requirements.



CARL WIRTH & SON, INC. 1625 CLINTON AVE. NO. ROCHESTER 5. N. Y

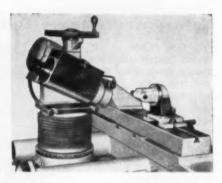
duction jobs, stops can easily be set for automatic selection of two predetermined speeds. Heavy-duty drive unit takes a 2 hp, 3 phase motor. Double V-belts throughout the drive from the motor to the spindle deliver maximum gripping power.

Other features include: "zero precision" tapered roller spindle bearings, a 54 pitch gear box and a friction disc clutch for engaging power longitudinal and power cross feeds.

The Sheldon Machine Co., Inc., Dept. RB, 4258 N. Knox Ave., Chicago 41, Ill.

Tilting spindle on tool grinder

Easier setups, fewer setup changes and greater versatility are said to be advantages of the 25° tilting spindle on the Sterling G-2 tool & cutter grinder. Direct, positive setting of clearance angles without the use of



formulas speed setups and insure accurate grinding. Because the clearance angle is set by tilting the spindle it is not necessary to change the setting for different diameters of work. Spindle is reversible and rotates a full 360°, swing 10³4″.

McDonough Mfg. Co., Eau Claire, Wis.

Use postpaid card, Circle No. 141



Use postpoid card. Circle No. 493

Bridgeport 5, Conn.



DON'T LET THIS HAPPEN

End Oily Floors with

DRY-IT

Reduce Accidents and Costly Time-Offs
No Fire Hazard!

Write For Free Sample!

TAMMS INDUSTRIES, INC. 228 N. LaSalle St. Chicago 1, III.

Use postpaid card. Circle No. 494

MACHINE and TOOL BLUE BOOK

CE Station.

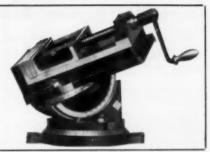
SET UP COMPOUND ANGLES INSTANTLY!

Now save valuable time on intricate, angu lor set-ups with the fully universal MASTER MULTI-SWIVEL VISE. Three swivels instantly set any compound angle. Used worldwide. Interchangeable platens optional.

Write for circular.

DONOVAN MFG. CO. 88 Batterymarch St.

Boston 10, Mass.



Use postpaid card. Circle No. 495

Press Extends Die Life

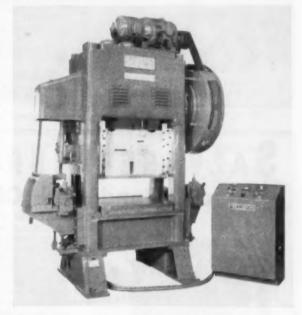
Prolonged die life is claimed for the antifriction ball-bearing raceway construction of the 75-ton automatic Flexopress. The slide maintains vertical accuracy within .0005" and parallelism between slide face and bed within .0015". This accuracy prevents misalignment between punch and die, the major cause of die

High speed operation is made possible because of low ram inertia provided by lightweight aluminum-alloy ram construction, anti-friction bearings plus double air cylinder counterbalance.

A 15" side opening accommodates work up

to 14" wide. Automatic feed is infinitely adjustable up to 8" per stroke. The slide face measures 32" wide and 18" deep with a 2" diameter hole and a single knock-out. The 4" thick bolster, 36" wide and 30" deep, is removable. Stroke is standard 21/2". With slide in down position, maximum distance between slide face and bolster is 10".

Hardened and ground double feed

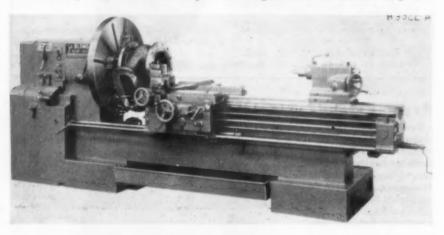


rolls have 360° cam lifters. The distance from the centerline of the rolls to the top of the bolster is adjustable from 4" to 5" and drive gear teeth are always on pitch center regardless of the material thickness. A scrap cutter is mounted integral with the feed rolls. Precision Welder & Flexopress Corp., 3520 Ibsen Ave., Cincinnati 9, O.

Lathe Has Sliding Bed

With sliding bed extended, this new 16" sliding bed gap lathe gives twice normal swing size, more than 50 per

cent greater distance between centers. With bed closed, it functions as a regular engine lathe. It handles large di-



SALVAGE YOUR SAWS Hack, Band and Circular



As an example a Wardwell "EC" Combination Grinder will sharpen a gross of Hack Saw Blades at least 6 times, thus saving the price of the machine. Thereafter it is yours—has cost you nothing.

Sharpens Band and Circular Saws too, with the same money saving. Only grinder that does not depend on shape of grinding wheel to form shape of teeth.

Write for Bulletin EC



MAKER OF LARGEST LINE OF SAW AND TOOL SHARPENING MACHINES.

ameter work, extra long pieces and parts with large projections.

Special bed slides open to form a gap, enables the lathe to change shape to suit odd-shaped parts. Capacities: Face 38" diameters in one cut; face 45" diameters in two cuts; with extension rest (optional) turn 27½" diameter, 13¾" length; with full-swing turning attachment (optional) turn 45" diameter almost full length of gap.

Other features: new spindle bearing design for high-speed turning; combination gear-belt drive headstock; 18 geared speeds and 9 timing belt-driven speeds from 8 to 2000 rpm; spur gear design; four-way rapid traverse.

The R. K. LeBlond Machine Tool Co., Dept. HS, Madison & Edwards Rds., Cincinnati 8, O.

Use postpaid card. Circle No. 143

Please mention MACHINE and TOOL BLUE BOOK when writing advertisers, or use the handy Readers' Service card opposite page



Multiple Spindle
Magazine Feed Power
Screw Driving Machines
Latest type equipment for
driving screws faster in
products requiring two or
more screws. These machines operate easily and
require very little attention or adjustment once
they are put in production.

Part Feeder

Model C Automatic Part Feeders provide an efficient means of feeding parts to Automatic Machinery. They are fast feeding, have large storage capacity and are easy to load.

Pat. applied for.



COOK & CHICK CO 2415 WEST 24th ST. CHICAGO 8, ILLINOIS

Use postpaid card. Circle No. 497



ELECTRIC HAND SHEARS 1/16"-3/32"-1/8" & 3/16" CAPACITIES.

ELECTRIC HAND NIBBLERS
18 and 14 Gauge Capacity.





Trumpf

CURVE, CUTTING-OUT & NIBBLING MACHINES FULLY UNIVERSAL FOR SHEARING, NIBBLING, CIRCLE CUTTING, FLANGING, PEENING and LOUVRE CUTTING. IN SEVERAL SIZES AND CAPACITIES, 12 GAUGE TO 11/32".

EXCLUSIVE FACTORY AGENT

JAMES W. GEORGE MACHINERY CO. 519 E. Jefferson Ave. Detroit 26, Mich.

OR YOUR DEALER



CAP SCREWS • COUPLING BOLTS
SET SCREWS • MILLED STUDS

*WM. H. Ottemiller co.

Use postpaid card, Circle No. 499



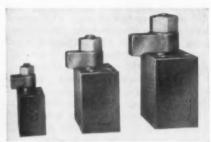
Surface Plates 50 sizes, angle plates 45 sizes, Parallels 30 sizes, Straight edges Steel or cast alloy 18 sizes, V Blocks 4 sizes, rescraping and special products.

Reply by Western Union Wire

TATRA TOOL CO.

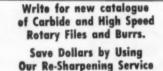
c/o Hitchcock Publishing Co. 1507 Edgefield Rd. Cleveland 24, Ohio Blocks for clamps

Monroe Engineering Products Inc., Dept. JS, 1515 Hurd Rd., Monroe, Mich.,



has recently developed blocks to receive hook and swing clamps. The blocks in turn are screwed to a simple base plate. Blocks eliminate machine work necessary to build a cast iron base plate or weldment and then machine the plate to receive the clamps.

Use postpaid card, Circle No. 144





ROTARY FILE COMPANY
404 E. SLAUSON AVE.
ADems 1-0165
LOS ANGELES 11, CALIF.

Use postpaid card. Circle No. 500

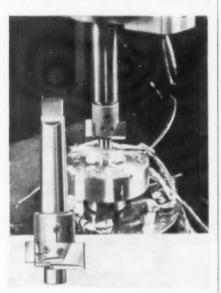
Use postpaid card. Circle No. 501

MACHINE and TOOL BLUE BOOK

Counterbore, spotfacer

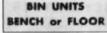
This two-bladed adjustable counterbore solves the problem of counterboring large diameters to precision tolerances and of holding specific diameters even after numerous regrinds. It is successfully used in spot-facing or counterboring steel forgings, heat treated steels, cast iron, titanium, stainless steel, aluminum alloys. Choice of straight or tapered shanks permits use in radial drills, drill presses, turret lathes, and milling machines. The blades of M3-type high-speed steel are adjustable laterally and are prevented from collapsing by set screws within the body at each blade end. No special grinding equipment is required and cutting angles of blades can be modified to best suit the material.

Blades are positively locked in position by two set screws bearing against the front tool faces. To overcome any tendency to rock or tilt, each blade is also guided by a vee tongue ground on the back of the tool which rides in a





Use postpaid card. Circle No. 502



FOR STORAGE

ASSEMBLY









BENCH MODELS

FIVE SIZES of removable BIN BOXES

Visible parts handling saves time and money!

Write for Catalog DEALERS IN PRINCIPAL CITIES

STANDARDIZED BY AMERICAS LEADING MANUFACTURERS MFG. CO.

FLOOR MODELS

PLYMOUTH, MICH



Jobbers' inquiries invited KEO CUTTERS

19326 Woodward - Detroit 3 Mich.

Use postpoid card. Circle No. 504

"DAVIS" KEYSEATERS



Built in 3 sizes for cutting keyways 1/16" to 1" width. Circular upon request.

DAVIS KEYSEATER CO. 4071/2 Exchange St. Rochester 8, N.Y.

Use postpaid card, Circle No. 505

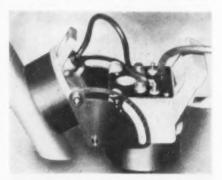
similar vee slot in the body itself. This locking method, in combination with a strong support provided by the body behind each cutter, produces an exceptionally rigid setup. Blades are mounted ahead of center, producing a shearing action which rolls tightly curled chips outwardly, away from the pilot. This cutter location also minimizes chatter under heavy loads at wide blade extensions by allowing deflection away from the wall, rather than springing cutters into the wall, causing digging and gouging. Five sizes cover hole sizes from 1" to 4" o.d.

Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Calif.

Use postpaid card. Circle No. 145

Magnetic welding fixture

The Mag-Tool magnetic welding fixture holds ferrous metals in position for welding at any angle without pre-

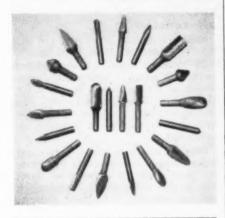


liminary setup time. The fixture instantly positions with absolute accuracy and releases immediately. Handling large or small pieces of metal easily, fixture is portable, requires only one operator. It is available in three models with a maximum capacity of one ton.

Magnetic Tool Corp., Dept. KE, 1955 Lafayette St., Santa Clara, Calif.

Carbide rotary mill

Ecarno-Mill, a carbide rotary tool with a new design, features a righthand double cut with a left-hand spiraled tooth. It is claimed that this arrangement produces a smooth, balanced cutting action and gives opera-



Mold your own LEAD HAMMERS

Here's the inexpensive, fast way of molding and remolding your own lead hammers with this COOK mold and ladle it pro-duces hammers that can "take it" Simple lo operate



Write for circular and prices

LAWRENCE H. COOK, INC. 67 MASSASOIT AVENUE, EAST PROVIDENCE 14, 2. L.

Use postpaid card. Circle No. 506



LEADING NAME IN BORING HEADS FOR 4 Write for catalog NN MANUFACTURING CO. FLOWERDALE AVE

Use postpaid cord. Circle No. 507

PREPARES COIL STOCK FOR PRESS

New Low Cost LIGHT-DUTY OILER-STRAIGHTENER \$95.00

Handles stock up to 3" wide, 1/4" (app.) thick

Write for details

JACO DEVICES, INC.

99 High St., Hingham, Mass. Use postpaid card. Circle No. 508

Precision EQ

Designed and finished for true dimensional SURFACE PLATES—ANGLES accuracy. Highest grade semi-steel. Catalog sent upon request.

PARALLELS-STRAIGHT EDGES





165 S. Barelay St., Milwaukee 4, Wis.

os of Service

Extra Capacity with COLLET

SPEED. ACCURACY. ECONOMY power. Instant release without stopping lathe.

Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over. Tremendous grip over or under stock size. Without adjustments. Shortest overhang. All grip ... no slip. No bearings... no heat or lost

SATISFACTION GUARANTEED!

Made in Three Sizes to Fit Your Requirements:

Model A ... 1" (max. capacity 1-1/16") Model A...1 (max. capacity 1-1/10)

Model C...3" (max. capacity 2-1/16")

Model C...3" (max. capacity 3¼")

Write today for illustrated catalog and price list – Dept.

HALL MANUFACTURING COMPANY 492 TULAROSA DRIVE, LOS ANGELES 34, CALIFORNIA

Use postpaid card. Circle No. 510

PURPLECT HOLES . PERFECT HOLES . PERFECT HO ES • PERFECT HOLES • PERFECT HO • PERFECT HOLES • PERFECT HOLE PREFECT HOLES . PERFECT HOLES LES . PERFECT HOLES . PERFECT · PERFECT HOLES · PER BCT HOLES . PRIFECT HOLES . PERFS . PERFECT HOLLS . PERFECT HOLES PRIFECT HOUS . PRIFECT HOUS T HOURS . PERFECT HOURS . PERFECT MOLES . PERFECT HOLES . PERFE . PRINCET IS JO PERHECT HOLES . PRINTED HOUS . PENTECT HO CT HOUS . MINNEY HOUS . PRINCE HO AND A PERSON MAKES & PERSON PROFEST HOUSE + PROFEST HOUSE + PROFEST HES M & PERFECT HOURS & PE . A HEW INVENTION A NEW MACHINING METHOD BOTARY BROACHING

A NEW NAME TROTAGY ORGACUS. SOCIARY INCACHES may be used in orbee, outsingtion drill present etc. to replant resource. They preduce perfect holes with finished that can only be compared to bening. They lad began before granding in necessary and may be pened 18 to 10 times. They preduce period at a fraction of the cost of those produced by

THIS NEW MACHINING METHOD-ROTARY BROACHING not Affined Not To Use Botory Broadens (Write for free d

When you want Parfact Hales, consult

SHEARCUT TOOL COMPANY

P.O. Box 746, 7045 Darby Ave., Reseda, Cal.

Use postpaid card. Circle No. 511

tors a maximum degree of control. Recommended for die, mold and pattern

Severance Tool Industries Inc., 722 Iowa St., Saginaw, Mich.

Use postpaid card. Circle No. 147

Wire De-Reeler automatically takes off tension

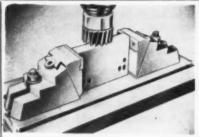
Ordinary 15 to 36 gauge wire and any type of magnet wire can be automatically removed from 12 inch diameter reels, with safety in handling and protection of the insulation, by using the Model D-54 "Spinning De-Reeler". The unit is adaptable for floor or table use with any type winding machine or equipment.

Easy to load and thread, a full reel is placed upon the base, then the rotating flyer assembly is screwed down into it. This automatically tightens the reel and assembly to the base. A turn-



1048 CHATEAU STREET, PITTSBURGH 33, PA.

Use postpaid card. Circle No. 512 MACHINE and TOOL BLUE BOOK



MASTER GRIPPING CLAWS System Hubner WHY use them?

I. Clamping action Vertical as well as Herizental—pressing workpiece down directly on the machine table. No hammering—no air between 2. Gain more working room. 3. Faster and more secure setups. Easier to handle. 4. Trilimited is wopening. 5. No straps overlapping on the workpiece; more machining surface. 6. Extremely versatilo—take light cuts or heavy cuts, use on small machines or heaviest production machines.

Exclusive Agents
KARL A. NEISE
404 4th Ave., Dept. MT,
New York 16, N. Y.

NEISE

Use postpaid card. Circle No. 514

handle gives extra leverage. Wire is spun off by the rotation of the flyer pulley—on uniform tension between two fibre discs (2" diameter) locked on a 5%" spindle.

Associated Production Co., Dept. RB, 162 N. Clinton St., Chicago 6, Ill.

Coolant system

The Trico-Mist coolant system eliminates heat from cutting edges of tools and work while drilling, tapping, milling, sawing, grinding. Container is filled with soluble wax or oil coolant, and shop air line hose (25 to 150 lb.) is attached.

A simple needle-valve controls size and volume of mist spray and provides shut-off. No air pressure is in the container at any time. A small nozzle directs the coolant to the cutting edge. Chips slide freely up the tool face and

are blown away. Available with one and five gallon containers—single or multiple outlets.

Trico Fuse Mfg. Co., 2948 N. 5th St., Dept. RB, Milwaukee 12, Wis.

Use postpaid card. Circle No. 149

General purpose electrode

A general purpose electrode which meets the A. W. S. and A. S. T. M. E-6013 classification, Airco 90B, is heavily coated, of moderate arc force, designed to operate in all positions on ac or dc.

Electrode is recommended for welding mild steel to medium carbon and low alloy steels. In addition to high mechanical and impact properties, the finished bead is free of surface depressions.

Air Reduction Sales Co., Dept. RS, 150 E. 42nd St., New York 17, N. Y. Use postpaid card, Circle No. 167



Large radius dresser

The "Giant" abrasive wheel radius dresser, accurate to .0002", quickly shapes and dresses large diameter grinding wheels-concave, convex or combinations of both. It will perform the same dressing operations on small bench surface grinders.

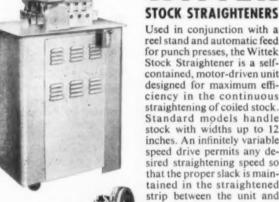
The operation is open and easy to see. There is no need to remove the abrasive wheel guard as the wheel is



dressed from below. Stop pins allow complete adjustment from 90° through

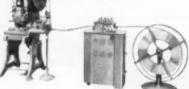
Economy · Dependability

WITTE



This typical Wittek automatic production feeding setup includes -Wittek roll feed mounted on the punch press, Wittek stock straightener, and Wittek self-centering reel stand.

Used in conjunction with a reel stand and automatic feed for punch presses, the Wittek Stock Straightener is a selfcontained, motor-driven unit designed for maximum efficiency in the continuous straightening of coiled stock. Standard models handle stock with widths up to 12 inches. An infinitely variable speed drive permits any desired straightening speed so that the proper slack is maintained in the straightened strip between the unit and the press feed.



Write for full particulars WITTEK Manufacturing Co.

4321 W. 24th Place . Chicago 23, Illinois



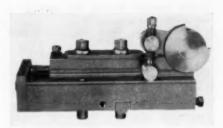
180°. Diamond dressing points are easily set by measuring with a micrometer from top of measuring hood to bottom of dresser arm.

Somerset Tool Co., 244 Virginia St., Hillside, N. J.

Use postpaid card, Circle No. 150

Cross-slide tool holder for multi-spindle automatics

This cross-slide tool holder can be used on either the front or rear cross



slide of multi-spindle automatic machines. Made for circular tools, the



"Cuts Machine-installation Cost 60% — and more"

That's the figure reported by American Type Founders after they'd used Barry Mounts on production machinery. Substantialoperatingsavings, too, are quoted in "The Iron Age", reporting the results of Barrymount (E) installations at Wickwire Spencer Steel's Morgan Spring Division.

Here are three reasons Barry Mounts will save time and money for YOU.

You don't have to drill floors, set anchors, and lag down machines.

Just put a Barry Leveling Mount on each machine foot and set the machine right where you want it. The built-in vibration control won't let the machine "walk" so it doesn't need to be secured to the floor.

You can easily move any machine — anywhere.

All you do is pick if up and set if down in its new location. It's back in production in minutes.

You don't have to fuss with shims to get the machine level.

Just turn leveling screws of Barry Mounts and tighten locknuts.

Write for these two useful bulletins:
Reprint of "The Iron Age" report of proved savings.
Plant-survey chart showing cure for 8 production losses.

BARRY CONTROLS incorporated, 784 Pleasant St., Watertown, Mass.

holder operates within the capacity of the machine

R & L Tools, Dept. RS, 1825 Bristol St., Philadelphia 40, Pa.

Use postpaid sard, Circle No. 151

Disc filing machine

The Jemco disc filing machine may be equipped with two discs at one time ranging in size from 3\" to 12". Filing discs are available in different cuts suitable for type work to be performed.

For cutting non-ferrous metals, discs may be obtained in carbon steel: for ferrous metals, discs are of high speed steel and carbide may be provided. All discs come with ground teeth which may be re-sharpened by grinding when dull.

Versatile work table provides for mounting fixtures or special sliding tables for special operations. A one

Did you know that ---

Heavy machinery builders use this gage extensively for Quality Control



COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from 1/8" to 10" dia.

UNIQUE ADVANTAGES

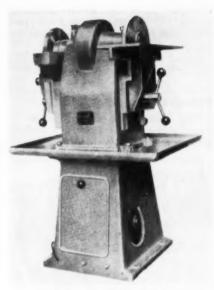
- Pesitive gaging accuracy to fraction of .0001" regardless of who operates it.
- · Indicates actual size, a fixed not passing - reading.
- · Positive 2-point gaging automatic centering.
- Shallow holes, deep holes, inside splines, open-end open-end holes gaged easily.
- Detects avality, back or front taper, bell mouth, barrel shape. · Reaches to bottom of blind
- holes.
- · Will gage work in the machine · A shop tool for all-day
- every day use.
- Portable no wires, hoses or stands.

Approximately 40 leading road machinery manufacturers employ COMTORPLUGS for precision checks of bores up to 10" diameter, to tolerances in tenthousandths. IT MAKES PRE-CISION GAGING EASY . . . at machines . . . at inspection bench . . . for selective assembly. No other like it - investigate and see why.

COMTOR COMPANY

62 Farwell St. WALTHAM 54 MASS.

GET THE FACTS - REQUEST BULLETIN 50



Jemco disc filing machine



NOW IT IS POSSIBLE

to hold tolerances of less than .001 on all lateral dimensions—from face-off to grooves, steps, etc.

This 'ROL-STOP INDICATOR' is hardened for long life.

Designed for W & S, J & L and Gisholt turrets. State model when ordering.

\$31.50-LESS INDICATOR

HENRY F. LANDY & COMPANY
GRANADA HILLS, CALIFORNIA

Use postpaid card. Circle No. 519



STANDARD TAPER PINS are milled from carefully selected bar stock to extremely close tolerances. . . straight to taper. The uniformity and accuracy of STANDARD TAPER PINS will save time on assembly . will assure you of troub'e free service. Available in STANDARD steel . . . also in tainless steel and brass. Specify STANDARD TAPEP DINS and other STANDARD products.

SEND TODAY FOR CATALOG

STANDARD STEEL SPECIALTY CO.
BEAVER FALLS . PENNSYLVANIA
Plants: Beaver Falls, Pa.; Hammond, Ind.

Use postpaid card. Circle No. 518





send for free 32-page catalog

the clamp folks / ADJUSTABLE CLAMP CO.

Use postpaid card, Circle No. 521

hp motor turns discs at five standard speeds: 175, 250, 310, 370, and 410 rpm. Additional speeds may be achieved by changing pulleys.

Jersey Mfg. Co., 436 Livingston St., Elizabeth, N.J.

Use postpaid card, Circle No. 152

Pre-ground tool bits

Chip groove and side clearance of these universal tool bits are hollow ground the full length of the tool, and



LASSY TAPPERS

New exclusive features and top quality make Lassy Tappers outstandingly the finest available for the toel room—small let production—and the problem jobs. A low priced investment that soon oays for itself. Write for illustrated circular showing 3 models and also Universal Tap and Die Guide.

LASSY TOOL CO. Plainville, Conn.

Use postpaid card. Circle No. 522



BOYAR - SCHULTZ CORPORATION 2008 S. 25th Ave., Dept. F-B, Broadview, III. Use postpaid card. Circle No. 523



INITIAL TYPE BENDING ROLLS

For quick forming of sheets and plates into cylindrical shapes the Beloit Initial Type Bending Rells are the best and most efficient made. Write for complete details.



HENDLEY & WHITTEMORE CO.

100 Blackhawk Blvd. Beleit, Wis.

the ends are beveled to provide either a right or left hand turning or facing tool. Since wear and dulling take place only on the tip of the tool, just the end must be reground, following the original angle. After the end has been ground sufficiently, a fine grade oilstone rounds the tip slightly, the lighter the cuts, the smaller the radius required.

Tool-Craft Co., Dept. RS, 109 Harvey St., Hackettstown, N.J.

Use postpaid card. Circle No. 153

THREAD GRINDING AND

PRECISION MACHINING

WARD THREAD GRINDING COMPANY

265 Howard Ave.

Bridgeport, Conn.

Use postpaid card. Circle No. 526

WALLS TU-WAY BELT SANDER Full 1/3 h.p. 6. E. Mater HORIZONTAL

VERTICAL

At last, a top quality industrial sander that provides all the most wanted features - yet sells for so little. *99.95 complete with cord, plug, switch ready to use

Illustrated Literature on Request
A few desirable distributer
territories still available.

WALLS SALES CORPORATION 333 Nassau Avenue Brooklyn 22, N. Y.

Use postpoid card. Circle No. 525

2 New Tools



THREAD TRIANGLES
Will quickly measure all 60°
pitch diameters. 4 to 56 pitch,
all 0.D.'s standard and nonstandard. No fancy calculations. Just add a constant to
the 0.D. Comes complete with
the dase. \$10.00



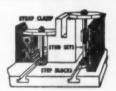
Sold on Approval—Catalog on Request

MONTGOMERY TOOLS

Bigelow 8-1045

TA TICHENOR LANE N

CHENOR LANE NEWARK 5, N.J.
Use postpoid cord. Circle No. 527



SURE GRIP STEP BLOCKS

Clamping tools of all types
Write for free tracing templates

TIETZMANN TOOL CORP.

Dept. C. T.

Englewood, Ohio

Fluorescent lamps

Localite fluorescent lamps are now available in two models. Model 8-F28M -705 has a pedestal base for bench, table or desk mounting to provide instantly adjustable lighting of assembly, inspection, laboratory and other operations. Model 55-F28M-701 has a universal base for mounting on machine tools and equipment to light precision work areas. Both models are equipped





Ask for a Severance Catalog today!
Use postpoid card. Circle No. 529

with frictional disc and collar joints.

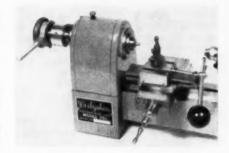
The Fostoria Pressed Steel Corp.,
Dept. RH, Fostoria, O.

Use postpaid card, Circle No. 154

Collet closer

A recent development in collet closers is shown here mounted on the Model 750 lathe.

This Hand-Quick collet closer will fit other lathe models, including the



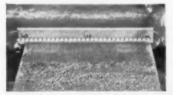
NEW, BETTER

C/R way wiper

guards the life, cuts downtime, saves costly maintenance on machine tool ways



ABOVE, lathe way badly scored through inadequate protection; BELOW, C/R Wiper keeps mill way clear, smooth.



CHICAGO RAWHIDE MFG. CO.

1223 Elston Avenue Chicago 22, Illinois IN CANADA: Manufactured and Distributed by Chicago Rawhide Mfg. Co. of Canada, Ltd. Hamilton, Ontario.

C/R Sirvene (synthetic rubber) Way Wipers will save you many times their cost by preventing scoring and abrasion of machine tool ways. Precision molded for extremely accurate fit, they will not trap harmful materials, but wipe ways clean of dirt, chips, fine abrasives and emulsions. leaving protective oil film. C/R Way Wipers are easily installed on flat ways, side rails, angles, columns and hydraulic rams. Write for detailed, illustrated brochure



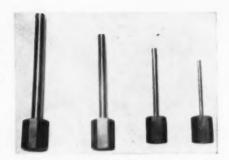
Webster-Whitcomb, Magnus and Elect. It can be used on cone-bearing or ball-bearing Lathes. The lathe operator can adjust collet tension quickly and change collets easily.

F. W. Derbyshire, Inc., Dept. DL, Waltham, Mass.

Use postpaid card. Circle No. 155

Flush pin gage line

The Royal Flush line consists of four standard and five special combination



For VERSATILITY IN THE SHOP — ON THE JOB

cut it with the

Here's real versatility in a Metal Cutting Bandsaw. The Wells 49-A is a dual purpose machine designed for shop or "job-site" work—economical to buy—economical to operate. Has 3" pipe capacity.

Use it as a horizontal cut-off saw to handle conduit cutting, bar stock or odd shapes. Swing the head into vertical position and the 49-A converts to an upright bandsaw for cutting angles, slots, notches, bevels and contour work.

The ½" blade is powered by a ¼ H.P. motor—other features include three selective speeds, positive vise action and automatic shut-off after each cut.

Ask your Wells Distributor for full information or write direct,



As a Vertical Bandsaw



For Horizontal Cut-off



The Pioneers of Horizontal

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORP.

707 Coolidge Avenue • Three Rivers, Mich.

Use postpaid card. Circle No. 531

MACHINE and TOOL BLUE BOOK

flush pin gages for use in the aviation. automotive, instrument and ordnance industries, in general machine shop work and in automatic screw machine work

Gages are honed inside and ground outside within tolerance of .0002, and are made of tool steel. Pin diameters are .1875", .2500", .3750" and .5000", Barrel diameters range from %" to 11/8" and lengths, from 11/8" to 11/4".

Foster & Allen, Inc., Dept. RS, Garwood, N.J.

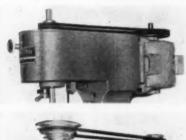
Use postpaid card, Circle No. 156

Continuous production drive drilling machine

A new type drive for the Edlund Model 2F drilling machine is designed for companies having long production runs either at one or several preselected speeds.

With single speed drive (single step sheave) drilling and tapping are provided directly from the motor through twin A-section V-Belts to the spindle. Belt tension adjustment is made easily from the front of the machine.

With five speed drive (five step sheave) power is transmitted through positive grip B-section V-Belt on a five-step sheave. Belt tension adjust-



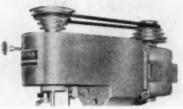




table.

ONE SHOT LUBRICATION PUMP FOR THE TABLE. TABLE FEEDS ARE CHANGED WITH-OUT STOPPING THE MOTOR AND WHILE THE TABLE IS MOVING.

REVERSE SCREW-NUT MECHANISM FOR LONGITUDINAL FEED WITH 3" DIAMETER LEAD-SCREW, REVOLVING IN OIL CUP, which guarantees high precision of the table for a long

TIME.

RAPID TRAVERSE for longitudinal feed.

SMOOTH WORM FEED TO SWIVEL HEAD—

90° each side. Positive lock in any position.

BACKLASH COMPENSATION ON LONGITUDINAL AND CROSS FEEDS.

CAM-LOCK DEVICE RELEASES OR BLOCKS

THE HEAD INSTANTLY.

SPINDLE: Designed by TIMKEN ROLLER

STANIBLE COMPANY with '9' previation roller. SPINDLE: Designed by TIMKEN ROLLER BEARING COMPANY with '0' precision roller bearings.

SYNDLE POWER FEEDS BOTH DIRECTIONS

No helt required for power spindle feed.

POWER FEED QUICK DISENGAGEMENT
LEVER stops spindle feed instantly.

ALL DIALS AND SCALES graduated in .001" graved for accuracy.
LL ELECTRIC CONTROLS CONCENTRATED IN FRONT.
STOP BUTTON STOPS ALL THREE MOTORS—

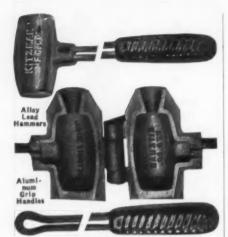
SPECIFICATIONS

TABLE				42"-41
Longitudinal				
				75-2850 r.p.m
				5" 003"00
uill travel	ALCOHOL:	CERT .	********	
dazimum dist	MHCH S	ol melle	to table	m
ARID TRAN	FREE			100" p.t
Micrometer de				
				001
				2 1 2
arge dials gr		stons	spindle	instantly
arge dials gr Brake inside	nulley	stops	spindle	instantly
arge dials gr Brake inside Motor and pul	pulley liey dy	namic	ally balas	instantly iced. 2750 lb

MANEX Machinery Corp. 204 Central Park So., New York 19, N.Y.

DISTRIBUTORS

Morey Machy. Co., N.Y. Joseph Beal, Boston H. Goldman, Detroit Morgan Machy., L.A



Hinged Hammer Meulds

1, 2½ and 5 lb. sizes—order your alloy lead
hammer requirements from your machine tool
supply house

or direct from:

KITZMAN MFG. CO.

15061 Hartwell Ave. Detroit 27. Mich.
Use postpoid card. Circle No. 533

economically priced press room equipment

DURANT Roll Feeds

Sixteen standard models that take stock from 2" to 12" wide. Insures accurate feeding—reversible—easy to install. Select O - Matic indexes available on 11 models.

Manufacturers of Stock Reels, Roll Feeds, Straighteners, Scrap Choppers, Die Fullers, Foot Presses, Coil Cradles, Press Guards, Stock Oilers.



WRITE FOR NEW FREE CATALOG

DURANT TOOL SUPPLY CO. PROVIDENCE 3, RHODE ISLAND

Use postpaid card. Circle No. 534

ments and belt speed changes are made from the front of the machine.

Both drives can be furnished in any selection of speeds and may be changed to other pre-selected speeds or be converted to infinitely variable speed drive.

Edlund Machinery Co., Division of Harso Corp., Cortland, N.Y.

Use postpaid card, Circle No. 158

Homing device extends range of tapping machine

A simple homing device returns the tapping machine spindle of the Hamilton Super Sensitive small-hole, precision tapping machine to neutral position instantly and automatically when pressure on the feed lever is released. This return to neutral stops rotation of the tap precisely as planned, and permits gentle withdrawal through reverse pressure on the feed lever.

Maintenance of the neutral position of the tapping machine spindle prevents any rotation of the tap before feeding pressure is applied. Because of this,



362

entrance of the tap into the work is slow and gentle, protecting brittle materials from damage due to impact.

Always classified and used as a precision, small-hole tapping machine, the homing device extends the capacity of the machine to work as small and fine as .034" x 120, and as large and coarse as .25" x 24.

The Hamilton Tool Co., Ninth St. at Hanover, Hamilton, O.

Use postpaid card, Circle No. 159

Fastening conduit fittings

Hub-Lugs provide a simple, quick fastening method which assures a moistureproof, more durable mounting of fittings in the electric control and operating systems on machinery.

Application is as follows: Place holding device over conduit; attach required fittings to conduit; slip holder back down over hubs on fittings; tighten with Allen wrench; secure fittings to machinery through holes in wings of unit. This method eliminates the need for drilling and tapping holes in fittings for fastening.

Ideal-Simplet Fittings, Inc., 1441 Park Ave., Sycamore, Ill.

Use postpaid card, Circle No. 160



February, 1957



HIGH SPEED HAMMER CO., INC.

estimate and equipment to use.

No cost or obligation.

We have the most complete line of riveting machinery and can recommend the correct type machine, tooled and ready, to go into operation upon receipt.





EASY TO REMOVE ABRASIVE TANK that cuts machine maintenance and abrasive refill time for the Gyro-Matic 21 automatic lapping machine is now standard equipment on the unit. This innovation permits precision flat lapping of piece parts on almost a non-stop production basis. Spitfire Tool Co., Dept. RB, 2931 N. Pulaski Rd., Chicago 41, III.



Use postpaid card. Circle No. 537

Dial bore gage kit

The Tri-O-Set dial bore gage kit contains three dial bore gages, with indicator in .0001". Gages cover range of 1/8" to 1/4", 1/4" to 1/2", and 1/2" to 1". They are quickly interchangeable, require only ten extensions to cover the entire range-have fixed equalizers from 1/4" to 1".

In addition, the kit contains the Setmaster, which eliminates the need for



master rings, masters the three dial bore gages to any dimension within a range of 0 to 1"

Boice Gages, Inc., Dept. RS, Hyde Pk., N. Y.

Use postpaid eard, Circle No. 162

MINIATURE DRILL BUSHINGS

Hole Sizes—No. 80 to 3/32" O.D. 3/32" to 13/64" Lengths 1/4" to 3/4" .0002 Tolerance on I.D., O.D., and Concentricity WRITE FOR CATALOG

PREBCO BUSHING CO.

14702 East Arrow Highway Baldwin Park, California

Use postpaid card, Circle No. 539

THE HELIOS 50 EK VERNIER CALIPER

With Automatic Thumb Lock . . . With all Inch Scales or one Inch and one Metric Scale:

\$9.90

The 55 A with set screw lock with one Inch and one Metric scale or all Inch scales:

\$8.90

All prices F.O.B. New York

Also available . . .

Dull Chrome finish call-pers and Dial Indicator calipers

For details on other imported precision instruments, write

MODERNTOOLS KARL A. NEISE, Bept. MT 404 Fourth Avenue New York 16, N. Y.

6" SCALE

HARDENED

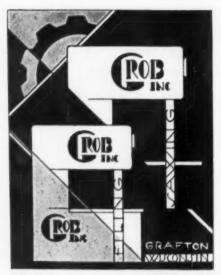
Guaranteed

Accuracy within .001" Double Length

Vernier

Use postpaid card. Circle No. 538





GROS INC.

GRAFTON, WISC.

Use postpaid card. Circle No. 541



790 S. Market St., Waukegan, Illinois Use postpoid card, Circle No. 542

Compact energy cartridge

Pre-assembled stack of multiple Belleville spring washers, held together



by pins or rivets passing through them at or near their neutral axis provides a compact unit which can be incorporated as a one-piece component in the final machine, and as such is easier to handle and install than loose washers

Associated Spring Corp., Dept DR, Bristol, Conn.

Use postpaid card, Circle No. 163

Angle dresser and tool holder

This tool has been specifically designed to incorporate the function of two tools in one: an angle dresser and a tool holder. The G-2 has an easy-toread vernier scale 0° to 180° guarantee-

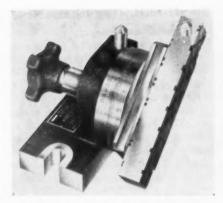
"KNOWN AS THE BEST" **GEM VISES**

Their "Versatility" and "Quick-Action", without use of cumbersome wrenches, will soon repay their cost in time-savings, safety and convenience.



Complete range of sizes for all Machines. Plain, Swivel & Tilting. Write for complete Information.

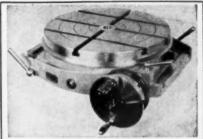
SPRINGFIELD, OHIO



ing accuracy within 2 minutes of 1°. It is a time saver to set up small jobs to be milled, drilled, tapped on any desired angle.

Rothfuss Tool Co., Box 2804, Providence 7, R.I.

Use postpaid card, Circle No. 164



WALTER

PRECISION DIVIDING ROTARY TABLES With & Without Dividing Discs

READABILITY: 6 SECONDS.
CONSTRUCTED FOR LONG LIFE.
MAINTAIN PRECISION.
AVAILABLE IN 10", 12½", 15¾", 19½", 25", 31".
Also many types of Universal Precision Dividing Heads and Attachments for most economical production.

Test reports furnished with literature. Sole Agents:

NEISE MODERNTOOLS

KARL A. NEISE 404 4th Ave., Dept. MT New York 16, N. Y.

Use postpaid card. Circle No. 544



- Can be used on lathes, drill press, jig bores or mills.
- Makes set ups in minutes instead of hours.
- Has been tested for telerances of up to .0003 of an inch.
- No wiring, no fuses, no complicated parts to adjust.
- Operates for months on one small standard flashlight cell.
- \$12.95 buys the entire unit complete and ready to go.

Dealers in principal cities.

For immediate delivery, send check or money order to RMAND PRODUCTS, INC.

20 WEST MORRILL AVENUE . COLUMBUS 7, OHIO

SLOCOM B micrometers

BETTER THAN EVER



Now produced by Connecticut craftsmen, the new, modernized, Slocomb micrometers are better than ever with 14

exclusive features that mean greater accuracy and longer wear.

Over 700 different models. Quick repair and reconditioning service. Write for our catalog.

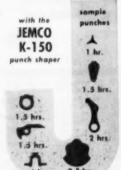
J. T. SLOCOMB CO.
Glastonbury, Connecticut

Use postpaid card. Circle No. 546

FORM and PUNCH SHAPER



ECONOMICAL PUNCHES with CURVED NECKS finished completely IN ONE CHUCKING



 finish job in one chucking

 30 power built-in microscope for high precision close tolerances

EXCLUSIVE TERRITORIES OPEN write for complete information to . . .



Jorsey manufacturing co. 401-A LIVINGSTON ST. • ELIZABETH, N. J. Use postpoid cord. Circle No. 547

Small mill, large capacity

A small Masters Arboga mill, Model EM-825, is powered with a 1 hp motor. Speeds are easily changed by two levers. Speeds are 125, 250, 305, 530, 610, 1060, 1250 and 2500 rpm.

Spindle has a conical roller bearing at the end and a thrust bearing at the top. The handwheel is graduated in 1000ths. Spindle taper accommodates standard taper shank drills with a No. 3 taper. End mill adapters are available for straight shank end mills in ½", ½" and %".

This Swedish-built mill is being distributed by the R. S. Kinney Co., Dept. HS, 6926 Jefferson St., Newton, O.

Use postpaid card. Circle No. 165

Coil cradles improved

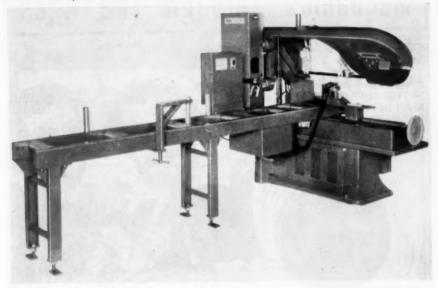
Improved Poweroll coil cradles handle stock to 24" wide x 48" in diameter and up to 3000 lb. in weight. They may be moved from one power press to another wherever an automatic slack loop of material is required. Sales of these units are now being handled directly by the manufacturer.

Medelton Co., Inc., 335 E. 142nd. St., Bronx 54, N.Y.

Use postpaid card. Circle No. 80



Automatic Bar Feed



The Roto-Veyor automatic bar feed was developed for use with the Wells Model 1200 horizontal band saw. The feed mechanism and stock clamping action is synchronized with the saw, converting it into a heavy-duty, completely automatic cut-off machine.

A manual control (forward-reverse) switch affords fast, convenient job setup or stock removal. All projection feed rollers are powered mechanically—electrically controlled.

The machine offers unlimited projection length, automatic hydraulic work vise, and positive stock stop with safety switch. Extension conveyor sections, available in 10 ft. multiples, are powered by the basic unit feed drive.

The bar feed has a capacity of 1234" o.d. for rounds, 12" x 12" for rectangular shapes. It will project to within 7" of end of stock.

Wells Mfg. Corp., 707 Coolidge Ave., Three Rivers. Mich.

Use postpaid card, Circle No. 166

CLIPPER PRECISION DIAMOND TOOLS

Industrial Diamonds
Thread Grinders
Turning Tools
Engraving Tools
Dressing Tools
Diamond Powder

Manufacturers of DIAMOND WHEELS

and Hones of highest quality. Prompt deliveries. Ask for literature CHANET TO THE CONTRACT OF THE

Representatives in Principal Cities

CLIPPER DIAMOND TOOL CO., INC.

345-D HUDSON ST. NEW YORK 14, N.Y.

Mechanics Through The Ages



ALTHOUGH THE INDIANS OF ABORIGINAL AMERICA KNEW LITTLE
OR NOTHING ABOUT THE USE OF
IRON, A BAND OF CHEROKEES,
LIVING IN CHEROKEE COUNTY, NORTH
CAROLINA, TOOK TO PRODUCING THE
METAL IN THE 1800'S USING AN AN—
TIQUE CATALAN FORGE, TURNING OUT C

TIQUE CATALAN FORGE, TURNING OUT CREDITABLE TOOLS AND IMPLEMENTS UNTIL COMPARATIVELY MODERN TIMES!



AS EARLY AS THE 5th CENTURY,
IRIGH MILLWRIGHTS - AS WELL AS MILL
OWNERS - WERE HELD LIABLE FOR ACCIDENTS TO MILL OPERATORS CAUSED
WE BY CARELESS OR DEFECTIVE WORK MANSHIP IN BUILDING AND MAIN TAINING THE MILLS!

DON'T OVERLOOK THESE FEATURES

MACHINE AND TOOL

blue book

More emphasis on planning. Donald C. Burnham, vice president in charge of manufacturing for Westing-
house Electric Corporation states, "We are focusing
The second secon
all the talent we can get in our organization upon
planning the manufacturing operation." The tech-
niques practiced at Westinghouse, including the
use of 3-dimensional small scale models of plant
layouts and details of the manufacturing laboratory
are described in this 8-page feature

Roundup of Washington News. Most major industries anticipate good production and sales rates for 1957 according to a year-end survey conducted by 25 divisions of the Business and Defense Services Administration. Estimates are broken down for the Iron and Steel, Aluminum, Machine Tools and Automobile segments.

Stepped Aluminum Extrusions. A. E. Huffman, Kaiser Aluminum and Chemical Co., describes how industries other than aircraft are becoming more aware of the economy when two parts can be combined in one with resulting savings in assembly, machining and basic material costs.

Plate Type Jigs for Low Cost Drilling. Tool design engineer Allan Young presents five types of plate or sandwich type jigs.

Milling Oil Grooves. C. T. Bower points out that while great accuracy was not required for this fixture, the problem entailed designing a fixture that was economical, easy to make and capable of taking other sizes of thrust plates.

News of Automation. Numill, a new and versatile tape control system, makes standard machine tools fully automatic. It is guided solely by instructions recorded by a standard electronic brain on magnetic tape and continuously monitored by automatic electronic gages.

An extension bed gap lathe proves its versatility for machining to .0004" and for swinging large, odd-shaped parts in a Texas plant.

How lathes are adapted to bore tubes and castings in a plant with short runs is described by H. Steel, general foreman of Clark Equipment Co., makers of lift trucks.

D	A	0	c
Г	M	G	C

	-	
ь.	т	. 1

111

119

129

132

138

146

180



Advertisements acceptable in THE MARKET PLACE include those for employment, sales services, production facilities, representation and related needs. Rates: \$20 per column inch per insertion. Maximum size advertisement accepted in this section is three inches.

Copy should reach us by the first of the month for next month's issue.

MACHINE and TOOL BLUE BOOK

A Hitchcock Publication

Wheaten, III.

FOR LAY-OUT WORK

use the "Circle-Key", a mechanical circle divider. Made and patented in Germany. No mathematics, no charts required. Used to divide a circle into any number of equal parts. This precision instrument, made of steel, nickel-plated, with case for \$6.95 from importer.

KURT EICHHOLZ

509 Oneida Street

Joliet, III.

END MILLS SHARPENED

.85 per end from 3/16 to 15/16 dia.

Return postage paid on orders for \$25.00 or better. 1 week delivery.

We also sharpen carbide end mills.

Prices upon request.

CUTTING TOOLS, INC. 134 Seymour Street Stratford, Conn.

Make your own Storage & Pallet Racks



with Amidon Fittings and one inch pipe.

Amiden Engineering Co. ELYRIA 10, OHIO

1 Minute

to locate an edge within .0005"!



JUMP EDGE FINDER

PRICE \$2.50 Complete satisfaction -

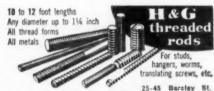
Postage free if payment with order

ELISHA PENNIMAN ELMWOOD 10,

"Key to Preventive Maintenance"
MACHINE TOOL RECONDITIONING
& the Art of Hand Scraping (New 2nd
printing)—useful for design, shop &

inspection work
Write for folder describing illustrated book

MACHINE TOOL PUBLICATIONS 215 Commerce Bidg., East 4th St. St. Paul 1, Minn.



25-45 Barelay St. Eastern Machine Screw Corp. New Haven, Conn.

Don't forget to mention MACHINE and TOOL BLUE BOOK when writing advertisers, or use the handy Readers' Service card opposite page 64.

INDEX TO PRODUCTS IN THIS ISSUE

MACHINE AND TOOL

blue book

Abrasive Belt Machines, 357 Abrasive Belt Machines, 307

Abrasive Cloth, Paper, Discs, Wheels, Stones,
Belts, etc. 87, 148-149, 203, 249, 258

Adapter Sleeves and Nuts, 327

Chucks, power, 251

Chucks, quick-change, 202

Chucks, seroll, 299 Air Circuit Accessories, 197 Air Feeds, 1 Air Filters, 213 Alloys, 118 Angle Bending Roll, 356 Angle Plates, 271, 333, 346 349 Arbor Spacers, Shim Stock, 168 Assembly Machines, 293 Balancing Machines, 36-37

Balancing Tools, 36-37 Bars. 118 Bases, Magnetic, 238 Bearings, ball, 205 Bearings, roller, 205 Bearings, thrust, 205, 337 Bench Centers, 248, 332 Benches, work, 141 Benches, work, 141
Bending Machines & Equipment, 74, 158, 218, 284,
310, 356
Copper Stock, 201
Counterbress, 235, 310
Counterbress, 235, 346, 258 Bin Units, 347 Blades, cut-off, 64, 237 Blanks, 55 Blocks, step 309, 357 Blecks, V. 271 Belts, latch, 300 Books, Back Cover Bering Heads, 204, 312, 349 Bering Machines, 70, 192, 194, 245 Bering Mills, 50 Bering Spindles, 175 Bering Tools, 10, 163, 204 Bering Tools, 10, 163, 204
Brakes, press, bending, 26-27, 79, 82, 158, 218, 298
Cylinder Clamps, 236
Cylinders, hydraulic, pneumatic, 96, 101 Brass Stock, 201, Broaches, 31, 350

Calipers, 256, 365 Cam Grinding, 292 Cam Milling, 292 Cams. 276. 324 Carbide Tools, 55, 63, 152, 170, 335, 359, 868 Die Sets, 69, 71, 111, 254, 368 Carbon, 118 Centers, bench, 248, 332 Centers, live, 113, 241, 304, 306, 817 Chasers, 277 Dies, 82, 203, 215 Dividing Heads, 212, 367 Chasers, 277 Dividing Heads, 212, 307
Draw Bars, 241
Dressers, tool, 369
Drill Heads, 172, 393
Drill Heads, multiple spindle, 172
Drill Point Thinners, 24-25
Drill Press Feeds, 1
Drill Press Tap Heads, 35 Chasers, Insert, 279 Chilling Machines, 232 Chucking Equipment, 226 Chucks, 43, 251, 255, 277, 299 Chucks, air-operated, 228 Chucks, ball bearing, 43, 265

Chucks, collet, 43, 228, 350

Chucks, keyless, 43 Chucks, tapping, 43, 202, 228 Clamp Sets, 309 Clamping Tools, 357 Clamping Tools, 357
Clamps, 206, 356
Clamps, atroperated, 206
Clamps, cylinder, 236
Clamps, toggle, 206
Clinchors, 196
Clutches, 79, 375
Clutches, friction, 375
Clutches, 85, 368 Coll Cradles, 86, 368
Cold Roll Forming Machines, 76 Collets, 73, 169, 192D, 228, 241. Comparators, dial, 89, 90 Comparators, optical, 155 Coolant Chillers, 232 Coolants, 20-21, 23, 104-105, 261 Copper Head Lang Collets, 73, 169, 192D, 228, 241, 277, 384 Couplings, flexible, 337 Cut-Off Blades, 237 Cut-Off Machines, 87, 183, 195, 379 Cut-Off Tools, 64 Cutters, 13, 31, 80-81, 170, 196, 243, 283, 818, 346, 358, 381 346, 358, 381
Cutters, keyseat, 348
Cutters, woodruff, 366
Cutting Fluid, Olls, 20-21, 23, 104-105, 261
Cutting Machines, 62, 195
Cutting Machines, 62, 195 Cutting Tools, 18-19, 101, 155, 173, 258, 381 Deburring Machines, Tools 358 Die Heads, 277 Die Makers' Supplies, 23 Die Making Machines, 24-25 Die Set Pullers, 368 Die Springs. Die Stock, 51-52-53 Dies, 82, 293, 318

D

X

0 D X Drilling Attachments, 172, 191

Drilling Attachments, multiple spindle, 172

Gages, surface finish, 357

Gages, thread, 41, 231

Drilling Machines, 61, 79, 74, 137, 286, 217 Drilling Machines, bench, 61, 270 Drilling Machines, precision, 269, 270 Drilling Machines, radial, Inside Back Cover, 15, 39, 61, 112, 194, 300 Drilling Machines, sensitive, 137, 269, \$70 Drilling Machines, vertical, 35 Drilling Units, 35 Drills, 18-19, 75, 78, 93, 253, 259, 318, 322, 381 Drills, core, 235 Drills, extension, 318 Drillis, stub. 323 Drills, subland, 93 Drills, twist, 235 Drivers, tool, 31 Drivers, work, 317 Duplicating Attachments, 389 Duplicating Machines, 29 Dust Collectors, 221, 274, 379 Dye, layout, 364 Edge Finders, 335 Electrical Discharge Machining, 225 Elevating Screws, 211 Embossing Equipment, 68 End Mills, 63, 173, 235, 259, 282, 329, 381 Back Cover Knd Mills, miniature, 334 Engravers, 45, 65, 336, 340 Engraving Tools, 369 Extensometers, 217 Fabricating Tools, 158 Face Mills, 31 Facing Heads, 324 Facing Tools, 310 Feed Fingers, 273 Food Screws, 211 Feeders, parts, 266 Peeds, 98 Feeds, automatic, 244 Feeds, drill press, 1 Feeds, roll, 86, 244, 883 Foods, rotary index, 86 Feeler Gage Stock, 168 Files, 346, 368 Files, rotary, 346 Filing Machines, 194, 317, 366 Filters, air, 213 Fixture Keys, 309 Flame Hardening Machines, 287 Flanging Machines, 326 Flat Stock, ground, 51-52-53, 278 Flexible Shaft Equipment, 153, 240, 263, 283 Flexible Shaft Machines, 153, 240, 263, 283 Floor Cleaners, 342 Floor Plates, 305 Form Relieving Fixture, 33 Form Tools, 31 Forming Machines, 158, 183, 293, 368 Furnaces, electrical, 84, 227, 280 Furnaces, heat-treating, 174, 227, 308, 319 Furnaces, industrial, 227 Gage Blocks, 13, 60, 72, 217 Gages, 41, 60, 89, 90, 155, 187, 222, 354 Gages, bench, 41 Gages, carbide, 72 Gages, groove, 41, 90, 222 Gages, height, 220 Gages, internal, 41, 217 Gages, micrometer, 248 Gages, plug. 72, 217, 231, 327, 354 Gages, plug reversible, 231 Gages, ring, 217, 327 Gages, snap. 217

Gages, special, 217

Gear Shapers, 167 Gears, 329, 337, 338 Gears, Geneva, 276, 329 Gears, helical, Gears, spiral, 329 Gears, worm, 329 Graduating Equipment, 68 Granite Surface Plates, 214 Grinders, 13 Grinders, bench, 379 Grinders, carbide tool, 273, 275 Grinders, centerless, 8-9 Grinders centertype, 8-9 Grinders, chucking, 8-9 Grinders, cutting, 275 Grinders, cylindrical, 275 Grinders, disc, 178, 379 Grinders, drill, 24-25, 311 Grinders, dustless, 3 Grinders, face mill, 24-25 Grinders, flute, 18-19 Grinders, heavy duty, 178, 273, 379 Grinders, internal, 39, 275 Grinders, jig, 293 Grinders, Micro-centric, 8-9 Grinders, optical projection, 39 Grinders, pedestal, 379 Grinders, portable air, 260 Grinders, portable electric, 193 Grinders, precision, 39 Grinders, profile, 39 Grinders, roll, 8-9 Grinders, rotary, Grinders, saw, 344 Grinders, surface, 8-9, 117, 275, 239, 249 Grinders, tap, 301 Grinders, template tool, 24-25 Grinders, thread, 369 Grinders, tool & cutter, 24-25, 29, 33, 45, 328, 344 Grinders, wet or dry, 379 Grinding Attachments, 28 Grinding Heads, 293 Grinding Spindles, 28, 175 Grinding Wheels, 148-149, 203, 249, 258 Guide Pin Bushings, 113 Guide Pins, 113, 254 Hammers, lead, 349, 362 Hardness Testing Equipment, 217 High Speed Steel, 56 Hinges, 314 Hob Sharpeners, 80-81 Hobbing Machines, 80-81 Hobs, 80-81 Holders, floating, 228 Holders, reamer, 272 Holders, tap and die, 228 Holders, tool, 262, 294, 234, 316 Holding Fixtures 228, 351 Holding Tools, 143 Honing Fixtures, 192A, 297, 388 Honing Machines, 192A, 297, 383 Honing Tools, 78, 297, 383 Horizontal Boring, 292 Indexing Machines, 276 Indicators, dial, 187, 217, 338, 355 Industrial Diamonds, 369 Insert Bits, 55 Insert Chasers, 279 Inspection & Measuring Devices, 187 Interferometers, 217 Internal Grinding Spindles, 175 Jig Boring, 292, 323

First In Quality All Ways

Conway

the Clutch of Robust Refinement

NFINITE precision in engineering, design and construction impart absolutely FINEST QUALITY. 54 years of constant advancement in skills and equipment enable you to profit by the extremely attractive cost of CONWAY CLUTCHES.

A wide variety of types and many sizes provide the correct answer to the innumerable demands in starting, stopping and running machinery. Every CONWAY CLUTCH is thoroughly dependable, thoroughly adapted to excellent performance on its particular duty.

Every clutch offers: contained and balanced construction, easy engagement, large lever ratio, direct release, drag-free idling, simple adjustment, overload power capacity, large frictional areas and powerful leverage.



Standardized, interchangeable parts precision-built of basic materials.



WRITE FOR NEW BULLETINS FOR EVERY TYPE OF INDUSTRY

THE CONWAY CLUTCH CO.

1105 MARSHALL ST.

CINCINNATI 25, OHIO

Jig Feet, double end & screw type, 309 Jig Grinders, 293 Jigs & Fixtures, 35 Keys, machine, 355 Keys, woodruff, 355 Keyseat Cutters, 348 Keyseaters, 316, 348 Keyway Broaches, 162 Lapping Equipment, Compounds, 7 Lapping Machines, 7 Lapping Machines, centerless, 7, 8-9 Lapping Plates, 7, 214 Lapping Service, 72 Laps. 72, 356 Lathe Attachments, 355 Lathes, 16-17, 39, 61, 192B-C, 207, Inside Back Corne Lathes, automatic, 36-37, 317 Lathes, engine, toolroom, 194, 351 Lathes, geared near, Lathes, hand turret, 2 duty, 192B-C Lathes, geared head, 246, 295, 351 Lathes, instrument, 191 Lathes, precision, 246, 295 Lathes, speed, 379 Lathes, tool, gage-makers, 208 Lathes, tracer, 16-17, 208, \$17 Lathes turret, 2, 36-37, 194 Lathes, vertical turret, 194 Layout Dye, 364 Layout Plates, 305 Lead Screws, 211 Light Wave Equipment, 72 Lighting Equipment, 248, 268, 320 Lubricants, 20-21, 23, 104-105, 252, 261

Machine Keys, 355 Machine Knobs, 309 Machine Mounts, 230, 353 Machine Racks, 355 Magnetic Base, 238 Mandrels, expanding, 228, 313 Marking Devices, Stamps, 68, 157, 350 Marking Equipment, 68, 157, 291 Marking Machines, 68, 201, 368 Master Setting Discs, 72 Master Spacer, 228 Mechanical Packings, 7 Metal Cutting Machines, 62, 195 Metal Forming Machines, 218, 325 Metallizing, 233 Micrometer Dial Gages, 89 Micrometer Dial Indicators, 89 Micrometers, 217, 368 Micrometers, lightwave, 72 Milling Cutters, 13, 31, 170, 282, 318, 381 Milling Heads, 10 Milling Machine Attachments, 355 Milling Machines, 10, 13, 45, 47, 70, 176-177, 207, 289, 361

Milling Machines, bench, 86, 355
Milling Machines, contour, 45
Milling Machines, horizontal, 29-30, 246
Milling Machines, hydraulic, 224
Milling Machines, vertical, 10, 29-30, 50, 192, 194, 337, 361
Milling Spindles, 175
Mills, p82, 368
Mills, bollow, 341
Mills, stde, 282
Mills, straddle, 282
Mills, straddle, 282
Mills, straddle, 282
Mist Collecters, 221
Moided Fiberglas Plastics, 36-37
Motor Arbors, 229
Moorns, electric, 229
Mounting Equipment, 230, 353

Nameriate Markers, 383 Nibblers, portable, 345 Nibbling Machines, 345 Notching Equipment, 158, 331 Numbering Equipment, 68 Nut Tappers, 35 Nuts, 309 Nuts, self-locking, 40 Nutsetters, power, 114 Oller-Straightener, 349 Optical Flats, 72, 248

Ovens, 319
Packaging Machines, 36-37
Pans, tote, 329
Pantographs, 29, 45, 65
Parallels, 346
Parallels, box, 271, 349
Parallels, flat, 349
Parts feeders, 266
Piereing Machines, 293
Pins, guide, 113, 254
Pins, tanger, 355

Parts feeders, 266
Piereing Machines, 293
Pins, guide, 113, 254
Pins, taper, 355
Pipe & Tube Mills, 76, 183
Plastic Tooling, 293
Plates, angle, 271, 333, 348
Plates, bench, 214, 271
Plates, floor, 305
Plates, lapping, 214
Plates, asyout, 305
Plates, steel, 118
Plates, strace, 72, 214, 271, 305, 346, 349
Plates, T-slotted, 214

Portable Air Tools, 114, 260
Portable Electric Tools, 114, 179, 193
Porting Tools, 310
Precision Machining, 323, 357

Press Brakes, 26-27, 79, 82, 158, 218, 298 Press Guards, 368 Presses, 46, 215 Presses, arbor, 365 Presses, bed, 298 Presses, foot, 368 Presses, gap type, 218

Presses, gap type, 218
Presses, hydraulic. 82, 281
Presses, Knee, 298
Presses, mechanical, 82
Presses, O.B.I., 54
Presses, power, 54, 244, 281, 298
Presses, punch, 54, 86, 156, 158

Presses, ram, 86 Presses, straight side, 218 Presses, straight side single point, 215 Presses, transmat, 82

Presses, transmat, 82
Presses, turret punch, 88
Pressure Regulators, 218
Pulleys, 337
Pumps, coolant & lubricant, 13, 307

Pushers, 384

Punch Press Sets. 399
Punches, 85
Punches, bench, 85
Punches & Dies, 85
Punches, transfer, 339
Punching Equipment, 74, 85, 368

Racks, machine, 355
Reamer Holder, 272
Reamers, 80-81, 93, 235, 268, 259, 319, 318, 358
Reamers, center, 75
Reels, stock, 362
Reinforcing, stoel, 118
Retainer Plates, 85
Rivet Setters, 42
Rivet Spinners, 312, 342, 363

Riveting Machines, 196, 312, 342, 363 Rivets, 42 Rod Parters, 158 Roll Feeds, 244, 362 Roll Forming Machines, 183 Roll Marker, 155 Rollers, 158 Rolls, 183 Routers, 259 Rubber Cushloned Abrasives, 258 Sanders, belt, 357 Saw Blades, band, Inside Front Cover, 51-52-53, 223, 278, 285, 315 Saw Biades, carbide, 75 Saw Blades, circular, 75 Saw Blades, cut-off, 75 Saw Blades, hack, 51-52-53, 228, 278, 285 Saw Frames, hack, 285 Saw Sharpeners, 344 Sawing Machines, 366 Sawing Machines, band, Inside Front Cover, 194, 360 Sawing Machines, hole, 278 Saws, slitting & slotting, 381 Scrap Cutters, 316, 368 Screw Drivers, power, 114, 345 Screw Driving Tools, 14 Screw Machine Products, 346 Screw Machines, automatic, 13, 22, 29 Screws, 309 Screws, cap, set, socket and machine, 198-199, 346 Services: Boring, Grinding, Lapping, Milling, Repairing, etc., 72, 216, 292, 323, 357 Shaft Seals, 7 Shapers, 11, 26-27, 246, 368 Sharpening Stones, 203 Shear Blades, 75 Shearing Machines, 26-27, 74, 158, 288 Shearing Tools, 345, 288 Shears, hand, 325, 345 Shears, lever, \$25 Shears, power squaring, 58-59 Shears, throatless, 288 Sheets, steel, 118 Shell Mills, 235, 282 Shim Stock, 168 Single Point Tools, 31 Sleeves, utility, 219 Slitting Machinery, 76 Slotting Cutters, 243 Socket Screw Products, 198-199 Special Machinery, 293, 298 Special Purpose Steel, 56 Special Tools, 293, 316 Speed Reducers, 337, 338 Spindles, 175 Spotfacers, 235 Spring Coilers, 189 Spring Stripping Units, 57 Spring Winders, 158 Sprockets, 337 Square Hole Drills, 315 Square Hole Sleeves, 296 Squares, engineer, 44 Squares, steel, 44 Stainless Steel, 118 Stamping Service, 216 Stamps, steel, 157, 350 Steel Blue, 864 Steel and Steel Stock, 34, 51-52-53, 56 Step Blocks, 309, 357 Stock Otlers, 368 Stock Reels, 362 Stock Straighteners, 349, 352, 362

Stones, hand, 203

Storage Bins, 347

Straight Edges, 271, 349, 348

Straightening Rolls, 86 Strip, steel, 118 Structurals, 118 Stub Screw Machine taps, 154 Stud Sets, 309 Stud Setters, 203, 277 Subland Cutting Tools, 93 Superfinishers, 36-37 Surface Finish Indicators, 217, 857 Surface Finish Standards, 357 Surface Grinding, 292 Surface Plates, 72, 214, 271, 305, 346, 349 T-Slot Nuts, 309 Tables, elevating, portable, adjustable, 141, 257 Tables, positioning, 275 Tables, rotary index, 1, 276, 293, 307 Tap Drivers, 143 Tap Extensions, 200 Tap Guide, 356 Taper Pins, 355 Tappers, 77, 172, 286 Tappers, automatic reverse, 172 Tappers, hand, 356 Tappers, lead screw, 77
Tappers, lead screw, 77
Tapping Attachments, 172, 202, 265, 286
Tapping Heads, 265, 286, 303 Tapping Machines, 35, 202, 265, 267, 303 Tapping Units, \$5, 265, 303 Taps, 66-67, 154, 277, 318, 381 Taps, collapsible, 66-67, 277 Teflon Products, 7 Templates, tracing, 357 Thread Compounds, 7 Thread Grinding, 292, 357 Thread Rolling Machines, 12 Thread Triangles, 357 Threaders, hand, 356 Threading Machines, 35, 106, 267 Toggle Clamps, 206 Tool Holders, 284, 262, 294, 316 Tool Posts, 294 Tool Posts, turret, 347 Tool Steel, 34, 51-52-53 Tooling, 82, 163 Tools, cut-off, 64 Tools, precision, 13 Tote Pans, 329 Transfer Machines, 293 Transfer Punches, 330 Tube Cutting Machines, 38, 76 Tubing, 118 Turning Tools, 369 Turrets, toolpost, 341, 347 Utility Sleeves, 219 V-Blocks, 271, 333, 346 Valves, 48-49 Valves, air, 48-49 Vibration Test Machines, 317 Vise Stop, adjustable, 335 Vises, bench and Machine, 32, 290, 322, 323, 343, 351, 366 Washers, 309 Way Wipers, 359 Ways, 93 Wheel Dressers, 2011 Wheels, cut-off, 87 Wheels, diamond, 242 Wigglers, 367 Wires, measuring, 72 Woodruff Cutters, 366 Work Drivers, \$17 Work Handling Devices, \$17 Wrenches, 4 Wrenches, automatic, 321

Wrenches, socket, 4

Straighteners, 86, 281, 349, 352, 362

INDEX TO ADVERTISERS

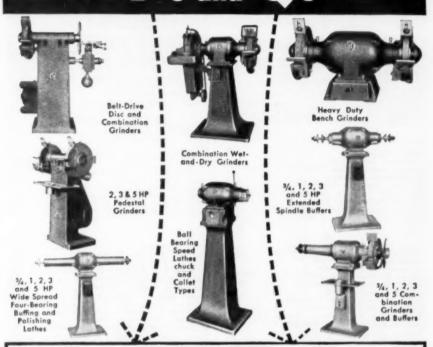
MACHINE AND TOOL

blue book

A	
Aaron Machinery Company Abart Gear and Machine Company	39-45
Abart Gear and Machine Company	333
Ace Drill Bushing Co.	83
Ace Drill Corporation Acme Danneman Company, Inc.	323
Acme Danneman Company, Inc.	368
(Danneman Die Set Division)	
Acme Scientific Co.	248
Acme Tool Co. Adjustable Clamp Company Aget Manufacturing Company	179
Adjustable Clamp Company	356
Aget Manufacturing Company	221
Alina Corporation	256
Aget Manufacturing Company Alina Corporation All American Tool & Manufacturing Co Allegheny Ludlum Steel Corporation Allen Collet Manufacturing Company Allied Products Corporation Aloris Tool Company American Brass Compony American Brass Compony American Chain & Cable Company (Campbell Machine Div.)	o. 317
Allegheny Ludlum Steel Corporation	34
Allen Collet Manufacturing Company	384
Allied Products Corporation	85
Aloris Tool Company	294
American Brass Company	201
American Chain & Cable Company	87
(Campbell Machine Div.) American Roller Die Corporation American Tool Works Company	100
American Roller Die Corporation	183
American Tool Works Company	Cover
Ames Company, B. C.	COAGL
Amidon Engineering Company	272
Anderson Brothers Mig Company	201
Amidon Engineering Company Anderson Brothers Mfg. Company Apex Machine & Tool C:mpany Apex Tool & Cutter Company Armand Products. Inc. Armstrong-Blum Mfg. Co. Inside Front Armstrong Brothers Tool Company Arter Grinding Machine Company Alter Press Company	14
Apex Tool & Cutter Company	329
Armand Products Inc.	367
Armstrong-Blum Mtg. Co. Inside Front	Cover
Armstrong Brothers Tool Company	4
Arter Grinding Machine Company	275
Atlas Press Company	295
(Clausing Division)	
Atrax Company	259
Atrax Company Auto Moulding and Manufacturing Co	314
В	
Baker Brothers, Inc.	101
Balas Collet Mig. Company	192-D
Baker Brothers, Inc. Balas Collet Mia. Company Baldor Electric Company Barber-Colman Company	273
Barber-Colman Company	80-81
Barnes Drill Company	78
Barry Controls, Inc. Bathey Manufacturing Company Bay State Abrasive Products Co.	353
Bathey Manufacturing Company	347
Bay State Abrasive Products Co	.148-149
Beaver Gear Works, Inc.	329
Beaver Rotary File Company	346
Behr-Manning Company	203
Bellows Company	1
Benchmaster Manufacturing Company	86
Beverly Shear Mig. Company	
Black Diamond Saw & Machine Works	311
Blanchard Machine Company	745
Blue Valley Machine & Manufacturing	Co. 326
Bay State Abrasive Products Co. Beaver Gear Works, Inc. Beaver Rotary File Company Behr-Manning Company Bellows Company Benchmaster Manufacturing Company Beverly Shear Mfg. Company Black Diamond Saw & Machine Works Blanchard Machine Company Blue Valley Machine & Manufacturing Boggis & Company, Henry P. Borel & Dunner	301
Borel & Dunner	330
Boyar Schultz Company	330
Borel & Dunner Boyar Schultz Company Bremil Manufacturing Company Brightboy Industrial Division (Weldon Roberts Rubber Company)	250
Welden Roberts Bubber Company	236
Brackfield Inc.	234
Brookfield, Inc.	634

Brown & Sharpe Manufacturing Company	13
Bryant Gage & Spindle Division	41
(Bryant Chucking Grinder Company)	
Buck Tool Company	299
Busch Company I. C.	349
Buffalo Forge Company	74
Bullard Company	6-17
Rura Tool Company	262
Brown & Sharpe Manutacturing Company Eryant Gage & Spindle Division (Bryant Chucking Grinder Company) Buck Tool Company Busch Company, J. C. Buffalo Forge Company Pullard Company Burg Tool Company	200
С	
Carroll-Jamieson Machine Tool Co.	351
Challenge Machinery Company	271
Chandler Tool Company	312
Challenge Machinery Company Chandler Tool Company Chicago Gear Works Chicago Manufacturing & Distributing Co. Chicago Rawhide Manufacturing Co. Chicago Rivet & Machine Company Chicago Tool & Engrg. Company Cincinnati Electrical Tool Company Cincinnati Gilbert Machine Tool Compan	337
Chicago Latrobe	253
Chicago Manufacturing & Distributing Co.	252
Chicago Rawhide Manufacturing Co.	359
Chicago Rivet & Machine Company	42
Chicago Tool & Frara Company	335
Cincinnati Flectrical Tool Company	279
Cincinnati Cilbert Machine Tool Company	15
Cincinnati Gibert Machine 1001 Compan	A 10
Cincinnati Latha & Tool Company	0-3
Cincinnati Latine a fool Company	- 61
Cincinnati Grinders, Inc. Cincinnati Lathe & Tool Company Cincinnati Milling Machine Company (Cimcool Division)	23
Cincinnoti Shaper Company Circular Tool Company Clark, Cutler, McDermott Company Clark, Prothers, Jeep Leviller, McDermott Company	20.00
Cincinnati Shaper Company	26-27
Circular 1001 Company	000
Clark, Cutier, McDermott Company	230
Clemson Brothers, Inc. Cleveland Automatic Machine Company Clipper Diamond Tool Company	285
Clevelana Automatic Machine Company	22
Clipper Diamond Tool Company	369
Commander Manufacturing Company	286
Comtor Company Concentric Tool Corporation	354
Centinental Tool Works	306
C'ntinental Tool Works	31
Conway Clutch Company Cook & Chick Company Cook Incorporated, Lawrence H.	3/5
Cook & Chick Company	345
Cook incorporated, Lawrence H.	349
Cooley Electric Mig. Corp.	221
Crone Packing Company	
Criterion Machine Works	204
Cooley Electric Mig. Corp. Crone Packing Company Criterion Machine Works Crucible Steel Company of America Cunningham Company, M. E.	56
Cunningham Company, M. E.	350
Cutting Tools, Inc.	372
P	
Danly Machine Specialties, Inc.	77.1
Danly Machine Specialities, Inc.	200
Danneman Die Set Division	368
(Acme Danneman Company)	0.40
(Acme Danneman Company) Davis Keyseater Company Dayton Rogers Manufacturing Company Dazor Manufacturing Corporation	348
Dayton Rogers Manufacturing Company	Z16
Dazor Manufacturing Corporation	268
Denison Engineering Division	46
Derbyshire, Inc., F. W.	207
Detroit Die Set Corporation	111
Detroit Flame Hardening Company	287
Detroit Reamer & Tool Company	93
Denison & S.n., I. Arthur Denison Engineering Division Derbyshire, Inc., F. W. Detroit Die Set Corporation Detroit Flame Hardening Company Detroit Reamer & Tool Company Detroit Stamping Company Devlies Missobore	168
DeVlieg Microbore (Division of DeVlieg Machine Compa	163
(Division of DeVlieg Machine Compa	ny)

Everybody KNOWS the line that KNOWS its



PRICE is an attractive feature in the famous CINCINNATI general purpose buffers and grinders, supplied in a variety of capacities and designs since 1902.

QUALITY: however, has never been sacrificed in the production of these buffers and grinders. We sincerely believe the Cincinnati line is America's top dollar value!

Featured Nation-wide by Leading Distributors. Write For Catalogue TODAY!

Makers of a complete line of pedestal and bench grinders and buffers, speed lathes,
dust collectors and cut-off machines.



THE CINCINNATI ELECTRICAL TOOL CO.

306 MT. HOPE AVE., CINCINNATI, OHIO

DeWitt Equipment Corp	
Direton Division Henry 315	Jaco Devices, Inc. 349
	Jaco Devices, Inc
(H. K. Porter Company, Inc., of Pittsburgh)	Jarvis Corporation
Disston Division, Henry	Jarvis Exhautacturing Company 43 Jarvis Corporation 77 Jersey Manufacturing Company 368 Johansson Gage Company, C. E. 217 Johnson Gas Appliance Company 174 Jones & Lamson Machine Company 277
Dreis & Krump Manufacturing Company 218	Johansson Gage Company, C. E217
Dreis & Krump Manufacturing Company 218 Dremei Manufacturing Company 193 duMont Corporation 162 Durant Tool Supply Company 316, 362	Johnson Gas Appliance Company174
duMont Corporation	Jones & Lamson Machine Company277
Dykem Company364	v
Dyketti Company	K
	Kalins & Company, J. M338
E .	Kenco Manufacturing Company156
E & E Engineering Company236	Kent-Owens Machine Company224
Eastern Machine Screw Corporation279, 372 Economy Tool & Machine Co	Keo Cutters348
Economy Tool & Machine Co	Kidde Precision Tool Corporation323-324
Edlund Machinery Company 269	Vitamon Monutacturing Company 363
Eichhols, Kurt	Kilham Engineering, Inc. 325 Kitzman Manulacturing Company 362 Knight Machinery Company, W. B. 102 Kuzmik Company, Paul L. 242
Eisler Engineering Company, Inc276	Kuzmik Company, Paul L. 242
Elox Corporation of Michigan 225	seems and all the statement with the
Empire Tool Company 237	L L
Frickson Tool Company 228	
Erickson Tool Company 228 Ex-Cell-O Corporation 31	L. & L. Manufacturing Company280
and a second sec	Lamina Dies & Tools, Inc109
F	Landis Machine Company106
	Landy & Company, Henry F355
Fawick Corporation	LaPeer Manufacturing Company 206
(Fawick Airflex Div.)	LaPine & Company, Arthur S. 232 Lassy Tool Company
Fellows Gear Shaper Company164-165 Fen Machine Company	LeBland Machine Tool Company, R. K. 192-B-C
Ferracute Machine Company 298	Levin & Son, Lewis190
Ferracute Machine Company 298	Linley Brothers Company 312
Flyan Manufacturing Company 349	Logansport Machine Company Inc
Fiske Bros. Refining Company	Logansport Machine Company Inc. 197 Lucas & Son, Inc., J. L. 329 Luciter Furnaces, Inc. 308
Fulmer Company, C. Allen 383	Lucifer Furnaces, Inc308
G	M
	M. B. Products 260
Gallmeyer & Livingston Company239	M. B. Products 260 Machine Products Corporation 305
Geometric Tool Company Div	Machine Products Corporation 305 Machine Tool Publications 372
(Greenfield Tap & Die Co.) George Machinery Co., James W300-345 Gisholt Machine Company36-37	Madison Tool & Supply Company 316
Gisholt Machine Company 36-37	
	Manex Machinery Corporation301
Glenzer Company I. C. 219	Manhattan Supply Company347
Gienzer Company, J. C	Manhattan Supply Company 347 Martin Machine Company, J. E. 366
Gleenzer Company, J. C. 219 Glover Manufacturing Company 335 Goddard & Goddard Company 170	Manex Machinery Corporation 301 Manhattan Supply Company 347 Martin Machine Company, J. E. 266 Maserati Corporation of America 50-337
Gleenzer Company, J. C. 219 Glover Manufacturing Company 335 Goddard & Goddard Company 170	
Gleenzer Company, J. C. 219 Glover Manufacturing Company 335 Goddard & Goddard Company 170	
Gleenzer Company, J. C. 219 Glover Manufacturing Company 335 Goddard & Goddard Company 170	
Gleenzer Company, J. C. 219 Glover Manufacturing Company 335 Goddard & Goddard Company 170	McCrosky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Projection 293 Metallizing Projecting Company 293
Gleenzer Company, J. C. 219 Glover Manufacturing Company 335 Goddard & Goddard Company 170	McCrosky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Projection 293 Metallizing Projecting Company 293
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egan Co.) Greenerd Arbor Press Company 365 Greenfield Tap & Die Corp. 128-A	McCrosky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Projection 293 Metallizing Projecting Company 293
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. Å. Fay & Egan Co.) Greenfield Tap & Die Corp. 128-A Green Instrument Company 65	McCrosky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 215 Modern Machine Tool Company 318
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. Å. Fay & Egan Co.) Greenfield Tap & Die Corp. 128-A Green Instrument Company 65	McCrosky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 215 Modern Machine Tool Company 318
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. Å. Fay & Egan Co.) Greenfield Tap & Die Corp. 128-A Green Instrument Company 65	McCrosky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 215 Modern Machine Tool Company 318
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egan Co.) Greenerd Arbor Press Company 365 Greenfield Tap & Die Corp. 128-A	McCrosky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 257 Montgomery Tools 38 Montgomery Tools 357 Morris Co., Robert E. 288 Morse Twist Drill & Machine Company 18-19
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. Å. Fay & Egan Co.) Greenfield Tap & Die Corp. 128-A Green Instrument Company 65	McCrosky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 215 Modern Machine Tool Company 318
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egan Co.) Greenerd Arbor Press Company 365 Greenfield Tap & Die Corp. 128-A Green Instrument Company 65 Green Manufacturing Company 272 Greist Manufacturing Company 220 Grob, Inc. 366	McCrosky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 257 Montgomery Tools 38 Montgomery Tools 357 Morris Co., Robert E. 288 Morse Twist Drill & Machine Company 18-19
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company 99 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egam Co.) Greenerd Arbor Press Company 365 Greenfield Tap & Die Corp. 128-A Green Instrument Company 65 Green Manufacturing Company 272 Greist Manufacturing Company 270 Greist Manufacturing Company 366 H Hall Manufacturing Company 366	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 255 Modern Machine Tool Company 38 Montgomery Tools 357 Morris Co., Robert E. 288 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company 99 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egam Co.) Greenerd Arbor Press Company 365 Greenfield Tap & Die Corp. 128-A Green Instrument Company 65 Green Manufacturing Company 272 Greist Manufacturing Company 270 Greist Manufacturing Company 366 H Hall Manufacturing Company 366	McCrosky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 215 Modern Machine Tool Company 38 Montgomery Tools 357 Morris Co., Robert E. 298 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324 N National Acme Company 66-67
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company 99 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egam Co.) Greenerd Arbor Press Company 365 Greenfield Tap & Die Corp. 128-A Green Instrument Company 65 Green Manufacturing Company 272 Greist Manufacturing Company 270 Greist Manufacturing Company 366 H Hall Manufacturing Company 366	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 258 Modern Machine Tool Company 38 Montgomery Tools 357 Morris Co., Robert E. 298 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324 N National Acme Company 66-67
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egan Co.) Greenerd Arbor Press Company 365 Greenfield Tap & Die Corp. 128-A Green Instrument Company 65 Green Manufacturing Company 272 Greist Manufacturing Company 220 Grob, Inc. 366 H Hall Manufacturing Company 350 Hamilton Tool Company 137-139-141 Hammond Machinery Builders 3 Haskins Company, R. G. 263 Holler Tool Company 151-52-53	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 258 Modern Machine Tool Company 38 Montgomery Tools 357 Morris Co., Robert E. 298 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324 N National Acme Company 66-67
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egran Co.) Greenerd Arbor Press Company 365 Greenfield Tap & Die Corp. 128-A Green Instrument Company 65 Green Manufacturing Company 272 Greist Manufacturing Company 270 Greist Manufacturing Company 366 H Hall Manufacturing Company 350 Hamilton Tool Company 137-139-141 Hammond Machinery Builders 3 Haskins Company R. G. 263 Heller Tool Company 51-52-53 Hendley and Whittemore Company 310-356	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 258 Modern Machine Tool Company 38 Montgomery Tools 357 Morris Co., Robert E. 298 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324 N National Acme Company 66-67
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egran Co.) Greenerd Arbor Press Company 365 Greenfield Tap & Die Corp. 128-A Green Instrument Company 65 Green Manufacturing Company 272 Greist Manufacturing Company 270 Greist Manufacturing Company 366 H Hall Manufacturing Company 350 Hamilton Tool Company 137-139-141 Hammond Machinery Builders 3 Haskins Company R. G. 263 Heller Tool Company 51-52-53 Hendley and Whittemore Company 310-356	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 38 Montgomery Tools 357 Morris Co., Robert E. 288 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324 N National Acme Company 66-67 Nebel Machine Tool Corp. 11 (Smith & Mills Shaper Div.) Neill & Company, Ltd., James 238 Neise, Karl A. 351-365-367
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (]. A. Fay & Egan Co.) Greenfield Tag & Die Corp. 128-A Green Instrument Company 65 Green Instrument Company 272 Greist Manufacturing Company 273 Greist Manufacturing Company 266 H Hall Manufacturing Company 350 Hamilton Tool Company 137-139-141 Hammond Machinery Builders 3 Haskins Company, R. G. 263 Heller Tool Company 310-356 Herman Stone Company 310-356 Herman Stone Company 214 High Speed Hammer Company 214 High Speed Hammer Company 363	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 38 Montgomery Tools 357 Morris Co., Robert E. 288 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324 N National Acme Company 66-67 Nebel Machine Tool Corp. 11 (Smith & Mills Shaper Div.) Neill & Company, Ltd., James 238 Neise, Karl A. 351-365-367
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (]. A. Fay & Egan Co.) Greenfield Tag & Die Corp. 128-A Green Instrument Company 65 Green Instrument Company 272 Greist Manufacturing Company 273 Greist Manufacturing Company 266 H Hall Manufacturing Company 350 Hamilton Tool Company 137-139-141 Hammond Machinery Builders 3 Haskins Company, R. G. 263 Heller Tool Company 310-356 Herman Stone Company 310-356 Herman Stone Company 214 High Speed Hammer Company 214 High Speed Hammer Company 363	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 38 Montgomery Tools 357 Morris Co., Robert E. 288 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324 N National Acme Company 66-67 Nebel Machine Tool Corp. 11 (Smith & Mills Shaper Div.) Neill & Company, Ltd., James 238 Neise, Karl A. 351-365-367
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egran Co.) Greenerd Arbor Press Company 365 Greenfield Tap & Die Corp. 128-A Green Instrument Company 65 Green Manufacturing Company 272 Greist Manufacturing Company 270 Greist Manufacturing Company 366 H Hall Manufacturing Company 350 Hamilton Tool Company 137-139-141 Hammond Machinery Builders 3 Haskins Company R. G. 263 Heller Tool Company 51-52-53 Hendley and Whittemore Company 310-356	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 38 Montgomery Tools 357 Morris Co., Robert E. 288 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324 N National Acme Company 66-67 Nebel Machine Tool Corp. 11 (Smith & Mills Shaper Div.) Neill & Company, Ltd., James 238 Neise, Karl A. 351-365-367
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (]. A. Fay & Egan Co.) Greenfield Tag & Die Corp. 128-A Green Instrument Company 65 Green Instrument Company 272 Greist Manufacturing Company 273 Greist Manufacturing Company 266 H Hall Manufacturing Company 350 Hamilton Tool Company 137-139-141 Hammond Machinery Builders 3 Haskins Company, R. G. 263 Heller Tool Company 310-356 Herman Stone Company 310-356 Herman Stone Company 214 High Speed Hammer Company 214 High Speed Hammer Company 363	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 38 Montgomery Tools 357 Morris Co., Robert E. 288 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324 N National Acme Company 66-67 Nebel Machine Tool Corp. 11 (Smith & Mills Shaper Div.) Neill & Company, Ltd., James 238 Neise, Karl A. 351-365-367
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company, George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egan Co.) Greenerd Arbor Press Company 365 Greenfield Tay & Die Corp. 128-A Green Instrument Company 65 Green Instrument Company 272 Greist Manufacturing Company 272 Greist Manufacturing Company 366 H Hall Manufacturing Company 350 Hamilton Tool Company 137-139-141 Hammond Machinery Builders 3 Haskins Company 15-52-53 Hendley and Whittemore Company 310-356 Herman Stone Company 214 High Speed Hammer Company 363 Himoff Machine Company 292 duppert Company 292	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 38 Montgomery Tools 357 Morris Co., Robert E. 288 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324 N National Acme Company 66-67 Nebel Machine Tool Corp. 11 (Smith & Mills Shaper Div.) Neill & Company, Ltd., James 238 Neise, Karl A. 351-365-367
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company, George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (J. A. Fay & Egan Co.) Greenerd Arbor Press Company 365 Greenfield Tay & Die Corp. 128-A Green Instrument Company 65 Green Instrument Company 272 Greist Manufacturing Company 272 Greist Manufacturing Company 366 H Hall Manufacturing Company 350 Hamilton Tool Company 137-139-141 Hammond Machinery Builders 3 Haskins Company 15-52-53 Hendley and Whittemore Company 310-356 Herman Stone Company 214 High Speed Hammer Company 363 Himoff Machine Company 292 duppert Company 292	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 38 Montgomery Tools 357 Morris Co., Robert E. 288 Morse Twist Drill & Machine Company 18-19 Mummert-Dixon Company 324 N National Acme Company 66-67 Nebel Machine Tool Corp. 11 (Smith & Mills Shaper Div.) Neill & Company, Ltd., James 238 Neise, Karl A. 351-365-367
Glover Manufacturing Company 335 Goddard & Goddard Company 170 Gorton Machine Company George 29 Grant Manufacturing & Machine Co. 342 Greaves Machine Tool Div. 47 (]. A. Fay & Egan Co.) Greenfield Tag & Die Corp. 128-A Green Instrument Company 65 Green Instrument Company 272 Greist Manufacturing Company 273 Greist Manufacturing Company 266 H Hall Manufacturing Company 350 Hamilton Tool Company 137-139-141 Hammond Machinery Builders 3 Haskins Company, R. G. 263 Heller Tool Company 310-356 Herman Stone Company 310-356 Herman Stone Company 214 High Speed Hammer Company 214 High Speed Hammer Company 363	McCroeky Tool Corporation 243 McDonough Manufacturing Company 328 Melin Tool Company 173 Metallizing Engineering Company 233 Midwest Tool & Engineering Company 257 Minster Machine Company 38 Montgomery Tools 357 Morris Co., Robert E. 298 Morse Twist Drill & Machine Company 18-19 Mummert Dixon Company 324 N National Acme Company 66-67 Nebel Machine Tool Corp. 11 (Smith & Mills Shaper Div.) Neill & Company 238 Neise, Karl A. 351-365-367

SID TOOL COMPANY, INC.

Your headquarters for Special Taps and Drills now stocks...

SPEED SPECIAL SIZE MILLING CUTTERS



SIDE MILLING CUTTERS

Precision made in U.S.A.

IN STOCK FOR IMMEDIATE DELIVERY!

DIAM- ETER	WIDTH OF FACE	SIZE OF HOLE	PRICE
4	7/32	!	11.40
4	9/32 5/16	1	13.35
4	7/16	i	15.95
4	9/16	i	17.15
4	11/16	1	18.10
4 4	13/16	1	20.85 22.95
4	1 10/10		23.65
4	1 - 1/8	1-1/4	28.78
4	1 - 1/4	1-1/4	28.35
5	5/16		17.50
8 8	3/8	i	19.70
8	7/16	1	20.95
8	9/16		23.55
8 8	11/16	1	26.30
5	7/8	1-1/4	28.35 30.50
3	18/16	1	31.50
	1/4	1	21.60
	8/16	1	22.10
	3/8	i.	23.70
	7/16	i	25.30
	9/16	1	31.20
	11/10	1-1/4	33.45
8	13/16	1-1/4	35.75
	7/8	1	36.65
	15/16	1-1/4	36.50
	1/4	1	47.70
8	5/16	1	49.70
	3/8	1	51.95
	7/16	1	53.70
8	1/2	1	54,55
	9/16	1-1/4	56.65 57.50
	11/16	1-1/4	59.35
	13/16	1-1/4	60.50
	7/8	1-1/4	62.20
8	18/16	1-1/4	63.85
10	1/4	1-1/2	87.88
(10)	5/16	1-1/2	88.90
18	3/8	1-1/2	83.75
FØ	1/2	1-1/2	92.30
6.0	5/8	1-1/2	195.35
6.0	3/4	1-1/2	121.50
10	7 %	1-1/2	131.95
10	1	1-1/2	136.70
12	1/2	1-1/2	153.95
12	5/8	1-1/2	169.75
12	3/4	1-1/2	174.35
12	7/8	1-1/2	220.16
12	1	1-1/2	236.60

STAGGERED TOOTH SIDE MILLING CUTTERS

Precision made in U.S.A.

IN STOCK FOR IMMEDIATE DELIVERY:



DIAM-	WIDTH OF FACE	SIZE OF	PRICE
5 8	5/16	1-1/4	28.95
	3/8	1-1/4	21.88
	5/16	1-1/4	30.56
6	7/16	1-1/4	31.65
6	9/16	1-1/4	36.70
6	11/16	1-1/4	49.05
6	13/16	1-1/4	42.18
	15/16	1-1/4	44.55
	8/16 2/16	1-1/4	63.20
	9/16	1-1/4	70.55
	11/16	1-1/2	75.65
8	13/16	1-1/2	79.35
	7/8	1-1/2	83.25
. 8	1	1-1/2	87.35
10	-1/4	1-1/2	87.80
10	5/16	1-1/2	89.10
10	7/16	1-1/2	98.70
10	1/2	1-1/2	99.75
10	9/16	1-1/2	110.83
10	5/8	1-1/2	113.10
10	3/4	1-1/2	129.35
10	7/8	1-1/2	133.30
10	1	1-1/2	139.20
12	1/2	1-1/2	160.45
12	8/8	1-1/2	170.95
12			181.48
			221.00
			238.96
12	3/4 7/8	1-1/2 1-1/2 1-1/2	23

DEALER INQUIRIES INVITED

If you are a user of cutting tools it will pay you to be on our mailing list. We also stock special and standard sizes in slitting saws, end mills, etc. Write for circular new to Dept. B.

SID TOOL COMPANY, INC.

Cutting Tool Specialists

158 LAFAYETTE ST., NEW YORK 13, N. Y. Telephone: BEekman 3-4270

Nilson Machine Company, A. H	Staples Tool Company 235 Stow Manufacturing Company 240 Strand Flexible Shaft, Inc. N. A. 283 Stuart Oil Company, Ltd., D. A. 104-105 Sturdimatic Tool Company 304 Sturdy Broaching Service, Inc. 296 Sundstrand Machine Tool Company 325 Sunnen Products Company 192-A Sun Oil Company 20-21 Superior Steel Products Corp. 255 Sutton Tool Company 73 Syntron Company 73 Syntron Company 286
Noble & Westbrook Manufacturing Co 68	Stow Manufacturing Company240
Norgren Company, C. A213	Strand Flexible Shaft, Inc., N. A
Norma-Hoffman Bearings Ccrp205	Stuart Oil Company, Ltd., D. A104-105
Northwestern Tool & Engineering Company 309	Sturdimatic Tool Company304
	Sturdy Broaching Service, Inc296
0	Sunner Broducts Company332
Oliver Instrument Company24-25	Sun Oil Company192-A
Olkon Research Corporation245	Superior Steel Broducts Corn 254
O'Neil-Irwin Manufacturing Company158	Supreme Products Corp
Ottemiller Company, William H 346	Sutton Tool Company 72
	Syntron Company
P	Dyntion Company
Patton Manufacturing Company, Inc 313	T
Pedrick Tool & Machine Company	Tamms Industries, Incorporated342
Penniman, Elisha	Tapmatic Corporation
Penniman, Elisha	Tatra Tool Company 346
Plunket Machine Company, J. E322	Tatra Tool Company
Pope Machinery Corporation 175 Portage Double-Quick, Inc. 90 Porter Company, Inc., H. K. cf Pittsburgh 315	Thor Power Tool Company
Portage Double-Quick, Inc. 90	Thriftmaster Products Corporation 172
Porter Company, Inc., H. K. of Pittsburgh 315	Thriftmaster Products Corporation
(Menry Disston Division)	Tomkins-Johnson Company 196
Profit & Whitney Company132-133-134-133	Torit Manufacturing Co. 274
Procuries Sefets Church Company 202	Torit Manufacturing Co. 274 Transmares Corporation 300
Procunier Screety Chuck Company202	Tree Tool and Die Works
(Henry Disaton Division) Pratt & Whitney Company152-153-154-155 Prebco Bushing Company355 Procunier Safety Chuck Company202 Prutton Ccrporation	The state of the s
rumain root company Back Sover	U
0	Universal Engineering Company 184
Quality Tool Works 366	Oniversor Engineering Company
Quality Tool Works	V
Queen Only Machine 1001 Company	
0	Van Keuren Company
Racine Hydraulies & Machinery, Inc 195	Vapor Blast Manufacturing Company 297
Racine Hydraulics & Machinery, Inc. 195 Reading Machine Compony 316 Reliant Industries 222 Richards Company, J. A. 292 Rockford Machine Tool Company 176-177 Roll Feeds Corporation 244 Ross Operating Valve Company 48-49 Royal Oak Tool & Machine Company 33 Royal Products 241	Veet Industries, Inc. 112 Verson All Steel Press Company 82 Victor Machinery Exchange, Inc. 301 Vogel Tool & Die Corporation 331
Relignt Industries 222	Verson All Steel Press Company 82
Richards Company I A 292	Victor Machinery Exchange, Inc301
Rockford Machine Tool Company 176-177	Vulgar Tool Comporation
Roll Feeds Corporation 244	Vulcan Tool Company
Ross Operating Valve Company 48-49	
Royal Oak Tool & Machine Company 33	W
D and David and 241	
Roych Products	Wade Tool Company 2
Ruthman Machinery Company 307	Wales-Strippitt Corporation 57
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Joseph T. 118	Wade Tool Company 2 Wales-Strippitt Corporation 57 Wallace Supplies Manufacturing Company 62
Royal Products 241 Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Jcseph T. 118	Walls Sales Corporation 357
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Jcseph T. 118 S	Walls Sales Corporation 357
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Jcseph T. 118 S	Walls Sales Corporation 357
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Jcseph T. 118 S	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Icseph T. 118 S S 5 S Machinery Co. 194 Sales Service Machine Tool Company 54	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Icseph T. 118 S S 5 S Machinery Co. 194 Sales Service Machine Tool Company 54	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Icseph T. 118 S S 5 S Machinery Co. 194 Sales Service Machine Tool Company 54	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Icseph T. 118 S S 5 S Machinery Co. 194 Sales Service Machine Tool Company 54	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Icseph T. 118 S S 5 S Machinery Co. 194 Sales Service Machine Tool Company 54	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Icseph T. 118 S S 5 S Machinery Co. 194 Sales Service Machine Tool Company 54	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Icseph T. 118 S S 5 S Machinery Co. 194 Sales Service Machine Tool Company 54	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60
Ruthman Machinery Company 307 Ryerson and Son, Incorporated, Icseph T. 118 S S 5 S Machinery Co. 194 Sales Service Machine Tool Company 54	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 \$	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 \$ \$ 5 \$ 5 \$ \$ Machinery Co.	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool & Engineering Company 310 Wetmore Tool & Engineering Company 310 Wetmore Tool & Engineering Company 28
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 \$ \$ 5 \$ 5 \$ \$ Machinery Co.	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 28 Wiedemann Machine Company 28
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 \$ \$ 5 \$ 5 \$ \$ Machinery Co.	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 28 Wildey's Carbide Tool Company 55 Willey's Carbide Tool Company 55
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 \$ \$ 5 \$ 5 \$ \$ Machinery Co.	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 30 Whitnon Manufacturing Company 28 Wiedemann Machine Company 88 Willey's Carbide Tool Company 55 Wilton Tool Mig. Company 32 Wirth & Scn. Carl A 341
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 \$ \$ 5 \$ 5 \$ \$ Machinery Co.	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 310 Whitnon Manufacturing Company 38 Wildey's Carbide Tool Company 55 Wilton Tool Mig. Company 37 Wirth & Scn. Carl A 341
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 \$ \$ 5 \$ 5 \$ \$ Machinery Co.	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 310 Whitnon Manufacturing Company 38 Wildey's Carbide Tool Company 55 Wilton Tool Mig. Company 37 Wirth & Scn. Carl A 341
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 5 S	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 310 Whitnon Manufacturing Company 38 Wildey's Carbide Tool Company 55 Wilton Tool Mig. Company 37 Wirth & Scn. Carl A 341
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 5 S	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 310 Whitnon Manufacturing Company 38 Wildey's Carbide Tool Company 55 Wilton Tool Mig. Company 37 Wirth & Scn. Carl A 341
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 5 S	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 310 Whitnon Manufacturing Company 38 Wildey's Carbide Tool Company 55 Wilton Tool Mig. Company 37 Wirth & Scn. Carl A 341
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 5 S	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 30 Whitnon Manufacturing Company 28 Wiedemann Machine Company 88 Willey's Carbide Tool Company 55 Wilton Tool Mig. Company 32 Wirth & Scn. Carl A 341
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 5 S	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 28 Willey's Carbide Tool Company 37 Wilton Tool Mfg. Company 37 Wilton Tool Mfg. Company 37 Wirth & San, Carl A 341 Wisconsin Drill Head Company 352 Woods Machine Co., S. A. 229 Woods Machine Co., S. A. 229 Woodsort Tool Company 334 Woodworth Company 334 Woodworth Company 334 Woodworth Company 334
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 5 S	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 28 Willey's Carbide Tool Company 37 Wilton Tool Mfg. Company 37 Wilton Tool Mfg. Company 37 Wirth & San, Carl A 341 Wisconsin Drill Head Company 352 Woods Machine Co., S. A. 229 Woods Machine Co., S. A. 229 Woodsort Tool Company 334 Woodworth Company 334 Woodworth Company 334 Woodworth Company 334
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 5 S	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 310 Whitnon Manufacturing Company 38 Wildey's Carbide Tool Company 55 Wilton Tool Mig. Company 37 Wirth & Scn. Carl A 341
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 5 S	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 88 Willey's Carbide Tool Company 37 Wilton Tool Mig. Company 37 Wirth & San. Carl A 341 Wisconsin Drill Head Company 303 Wittek Manufacturing Company 324 Woods Tool Company 334 Woodson Tool Company 334 Woodworth Company, N. A. 226
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 5 S & S Machinery Co. 194 Sales Service Machine Tool Company 54 Sanford Manufacturing Corporation 117 Scherr Company, Inc., George 302 Schmidt, Inc., George T. 363 Scully-Jones & Company 123 Seneca Falls Machine Company 317 Sentry Company 34 Severance Tool Industries 358 Shearcut Tcol Company 350 Sheffield Corporation 221 Sheldon Machine Company 246 Sidney Machine Tool Company 381 Sigourney Tool Company 381 Sigourney Tool Company 270 Simonds Saw & Steel Company 223 Skinner Chuck Company 251 Slocomb Company, I. T. 368 Smith & Mills Shaper Div. 11 (Nebel Machine Tool Corp.) Snow Manufacturing Company 38 Somma Tool Company 54 Sonnet Tool & Manufacturing Company 282 Sonnet Tool & Manufacturing Company 282 Spellman Company, R. L. 330 Standard Die Set Manufacturers, Inc. 69 Standard Gage Company 181 Standard Pressed Steel Compony 40-198-199	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 88 Willey's Carbide Tool Company 37 Wilton Tool Mig. Company 37 Wirth & San. Carl A 341 Wisconsin Drill Head Company 303 Wittek Manufacturing Company 324 Woods Tool Company 334 Woodson Tool Company 334 Woodworth Company, N. A. 226
Ruthman Machinery Company Ryerson and Son, Incorporated, Icseph T. 118 \$ \$ 5 \$ 5 \$ \$ Machinery Co.	Wallace Supplies Manufacturing Company 62 Walls Sales Corporation 357 Walton Company 200 Ward Thread Grinding Company 357 Wardwell Manufacturing Company 344 Warner & Swasey 267 Watts Brothers Tool Works 315 Webber Gage Company 60 Wedin Corporation 211 Weldon Roberts Rubber Company 258 (Brightboy Industrial Division) Wells Manufacturing Corporation 360 Western Tool Supply Company 318 Wetmore Tool & Engineering Company 310 Whitnon Manufacturing Company 88 Willey's Carbide Tool Company 37 Wilton Tool Mig. Company 37 Wirth & San. Carl A 341 Wisconsin Drill Head Company 303 Wittek Manufacturing Company 324 Woods Tool Company 334 Woodson Tool Company 334 Woodworth Company, N. A. 226

Why Grind or Finish-Bore?

PRECISION HONE!



with a FULMER HONING MACHINE

NOW AUTOMATIC or manually operated

Switch from grinding or finish boring to Fulmer Honing! There's a double saving: you cut costs and release boring or grinding machinery for other uses.

Fulmer Honing Machines speed production and lower costs. Ruggedly constructed and engineered to handle greater loads than normal. They assure low upkeep under the most severe operating conditions and provide ample cutting power to the stones.

FULMER machines are designed with a minimum number of parts for minimum maintenance. Five basic sizes provide a machine fitted to any needs. Fulmer precision honing



for precision-honing internal bores of ferrous and non-ferrous metals, glass, plastic etc.

usually outperforms conventional grinding or finish boring! Find out how! Write for Bulletin on Honing to: C. Allen Fulmer Co., Dept. B 107 E. 4th St., Cincinnati 2, O.



R honing equipment



Pat.

Pending

GET

DETAILS NOW

It's New! It's Different!

TAPER LOCK
PUSHER

(NOW Featured by Allen)

No Friction

No Scratch

No Wear



Burns style Pushers wear in; practically no wear-out. The taper lock principle enables the gripping surface to expand and contract automatically within a different range which fits both hot rolled stock and cold finished stock without change of pusher. . . . The pusher locks positively in forward direction and opens freely in opposite direction . . No friction or scratch on return of pusher. Bar cannot bounce back from the stock stop. Eliminates short pieces that waste material and machine time . . . Taper lock holds regardless of length . . . Bars up to 20 feet and longer used with ease and without strain . . . The automatic adjustment of the taper lock increases the pusher life many times over that of the ordinary pusher.

will pay for themselves in 3-weeks time through tangible savings of money

Desirable territories open for representation, inquire now

ALLEN COLLET MFG. CO., INC.

17720 CLARANN AVE. . MELVINDALE, MICHIGAN

February, 1957 For free information . . . use these postage-free Action Cards

100	Liter	retu		circle	key	numbe	78	Nev	Prod	lucts			cir	cle ke	y num	bers
1	11	21	31	41	51	61 7	188	81	91	101 1	117 13	21 13	1 141	151	161	171
2	12	22	32	42	52	62 7	2	82	2.00		12 12				No. of Concession, Name of Street, or other Designation, Name of Street, or other Designation, Name of Street, Online of	
3	13	23	33	43	53	63 7	3	83			13 1:					
4	14	24	34	44	54	Berlin State		84			114 13					
5	15		35	2000	55	Telephone (5	85			115 1:					
6	16	26		2000	ER HENDE	66 7	Berger I	86		SOLAHOU .	116 1:	NAMED OF STREET	MARIN COMP.			
7	17	Time 1	37	100000	57		7	87			17 1:					
	18	28		/ Bad	Dodroidi	Bode (UCc)	8	88			119 1			DESCRIPTION OF THE PERSON OF T		1000
м	19		39	49	Bulet.	69 7 70 8	Della State				20 1					
	20	30			00	60	繼			N/S	Billi		ald			
	near															
la	me										Posit	ion				
	RE											D.D				
			7			7 7				*******						
Cit	y				1166	*********			******	Zone			State.			
	duce	MAG	Mag													
	verti				or ti	ree in	torma	TION		USE 12	iese p	ostag		le key		
201	27		251	276	201	326	351	376	401	426	481	476	501	526	551	574
202	22	17	282	277	302	327	352	377	402	427 428 429	453	477	502	527 528	582 583	577
204	22		254	279	384	329	354	379	404	429 430	454	479	504	529	554	並
205 206	22	11	256	281	305	331	356	381	406	431	456	481	506	531	556	561
208 208	23	3	258	283	308	333	358	383	400	433	458	483	500	533	558	583
208 218	23	35	260	284	310	334	350	385	410	434 435	460	485	510	534 535	559	584 581
211	7 2	16	261	286	311	336	361	366	411	436	461	486	511	536	561	580
555					100				433.2	12.7	4.4	497		4 7 4	662	10.0
213	21		263	288	312	337	363	388	413	437 438	463	487	512 513	537 538	562 563	581
213 214 215	21 21 24	18	263 264 265	288 288 288 290	312 313 314 315	338 338 339 340	363 364 365	388 389 390	413 413 414 415	437 438 439 440	462 463 464 465	487 488 488 480		537 538 539 540	562 563 564 565	58 58 58 59

Compony
Name Position

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY CARD
NO POSTAGE NECESSARY IF MAILED IN THE U.S.A.

3c POSTAGE WILL BE PAID BY

MACHINE and TOOL BLUE BOOK

READERS' SERVICE DIVISION

WHEATON, ILLINOIS

PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY CARD

NO POSTAGE NECESSARY IF MAILED IN THE U.S.A.

3c POSTAGE WILL BE PAID BY

MACHINE and TOOL BLUE BOOK

READERS' SERVICE DIVISION

WHEATON, ILLINOIS

Lightning fast speed change

a money making virtue!

This time saving feature of "AMERICAN" Pacemaker Lathes appeals strongly to operators who acclaim it a real money maker for them.

The speed plate is direct reading and shows at a glance the available spindle speeds and how to secure them. Operators can't go wrong. So fast, so easy to read and so simple that they do not hesitate to make speed changes to secure correct cutting speeds.

In addition, cutting speed snap-on plates are available indicating the lever positions for cutting various work diameters at the selected feet per minute cutting speed. These plates may be quickly applied and changed for the desired cutting speed.

No system for securing cutting speeds could be simpler, faster or less expensive in first cost and maintenance.

These and other fine features of the "AMERICAN"
 DeLuxe Model Pacemaker are illustrated and
 described by Bulletin No. 116.

SPINDLE SPEEDS

LEVER ROSSITIONS

WITH PROPERTY AND ADDRESS OF THE SPEEDS

300 340 420 178

800 340 400 470

1450 1700 2000

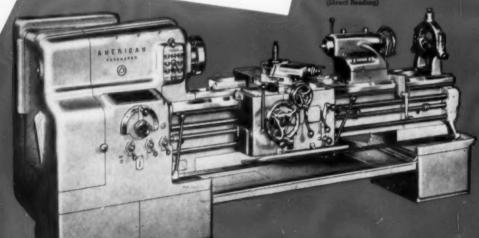
56 244 POSTIGAL

1050 ARRA CARROLL AND ADDRESS OF THE SPEEDS OF THE SPEED

Spir le Speed Plate (Dr. 2 Reading)



Cutting Speed Plate



THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U.S.A.

LATHES AND RADIAL DRILLS



Here's a catalog that exactly fits in a machinist's tool box in more ways than one. Not only are the Putnam Catalog physical dimensions exactly proportioned to fit within standard tool boxes so that it will always be handy, but, conveniently listed and illustrated within the Putnam Catalog are over 1400 different types and sizes of standard end mills.

Because at Putnam we specialize in the manufacture of end mills, you will find more standard sizes and types listed in this catalog than can be found in any other. Thus, on nearly every milling job you will find the quick and convenient answer to your end mill requirements right in your own tool box—in the Putnam Catalog.

If you would like a copy of this catalog, see your neighbor, the local Putnam distributor—this catalog is yours for the asking.

